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Eye Hazards from an Atomic Bomb

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On the basis of facts reported from Hiroshima and from laboratory studies heat rather than ionizing radiation is now considered as the gravest danger.

THE general opinion on the destructiveness to man of the A-bomb has shifted more and more. Instead of ionizing radiation, heat is now considered as the gravest danger. This shift is based on facts reported from Hiroshima and from laboratory studies. As will be shown in this article the same preponderance of possible heat damage holds for the eye. This statement is based on published data concerning a nominal atomic bomb of 20,000 tons TNT equivalent exploded in air and radiating, thermally, as a black body.

Protection against ionizing radiation would be necessary in the inner circle around the epicenter only. Whereas 600 to 900r is the threshold for formation of a radiation cataract,[5] 400r would kill half the population. Shielding the eyes, therefore, would be senseless unless the whole body is protected (see Table 1).

Mechanical and Smoke Hazards

The kinds of blast injuries to be expected from an A-bomb do not differ substantially from those experienced with chemical explosives. As was the case during air raids in World War II, flying glass and building debris particles will be the main mechanical hazard to the eyes. In addition, smoke of extended conflagrations will cause frequent temporary loss of vision. Plastic goggles of 3–4 mm thickness have been shown to prevent most of this damage. Laminated or hardened glass lenses may serve as a substitute, although the laminate form is not heat resistant.

Effects of Heat

Thermal radiation injuries of the skin are to be expected within a much wider area than any of the other factors (see Table 1), provided neither smoke, clouds, fog nor walls and other solid obstacles block the way of the radiation. Since the temperature of the bomb during its main phase coincides with that of the sun, and since similar amounts of atmospheric scattering and absorbent components are interposed, a solar-like spectrum arrives at the body. The heat effects on the skin differ in many respects from those observed at normal fires.[3,4] More radiant heat is reflected from and penetrates into white skin as compared with Negro skin. Burns caused in white and lightly colored skin, therefore, origi-

nate partly from overheating of layers as low as the corium. Dark skin, on the other hand, may show explosion-like blistering originating in the melanine layer.[2] Layers below the epidermis cool down after exposure so slowly that the main injury is done during the after-phase.

Protection of Eyelids

Immediate covering of the affected skin by other unaffected parts of the body, e.g., of the eyelids by the hands, would afford double protection. It would, possibly, shorten the exposure time (see Figure 1). Furthermore, it would drain away heat from the irradiated and still critically hot skin[2] layers.

At 10,000-foot distance from a nominal A-bomb, moderate burns of the skin of the lids may be anticipated. Eyebrows and dark goggles will ward off some of this damage. The burns will be more of the white skin type since the skin of the lids, owing to its folding and protection from goggles, tans less than the main body.

Lid damage, however, is a serious general damage, since it impairs vision during escape or other protective steps and since it may cause lid deformation which, in turn, would expose the cornea. Such a deformation would call for lengthy treatment and plastic surgery.

While the lid protects the eye by the involuntary blink reflex, and the hand soon thereafter covers the lid, the rest of the body can be protected by spinning around, thus diluting the incoming radiation.

Danger to Optical System

The maximum radiant heat flow applied to a piece of skin decreases with the square of the distance bomb to skin. The heat flow at the focus of an optical system, such as the eye lens and retina, follows an entirely different pattern. This flow, i.e., the radiation applied to a square unit of the target such as the retina, does not decrease with distance. Instead, the dimension of the image decreases linearly with distance. An example might illustrate this point: retreating from a fire, we feel less and less heat; pictures taken at various distances show smaller and smaller images of the fire, but the image brightness is constant.

TABLE 1

Effective Radius and Area for Damage by a Nominal Atomic Bomb Exploded in the Air on a Clear Day

	Feet	Acres
1. Lethal neutrons	2,300	38
2. 400r initial radiation (kills 50% of population)	4,250	130
3. Severe blast 5.2 psi	6,300	290
4. Incendiary action	6,300	290
5. Moderate blast 2.7 psi	8,800	560
6. Moderate skin burns	10,000	720
7. Retinal burns	far beyond 20,000	2,880

Distances given under 1 through 6 according to reference 1.
1r is one roentgen unit.

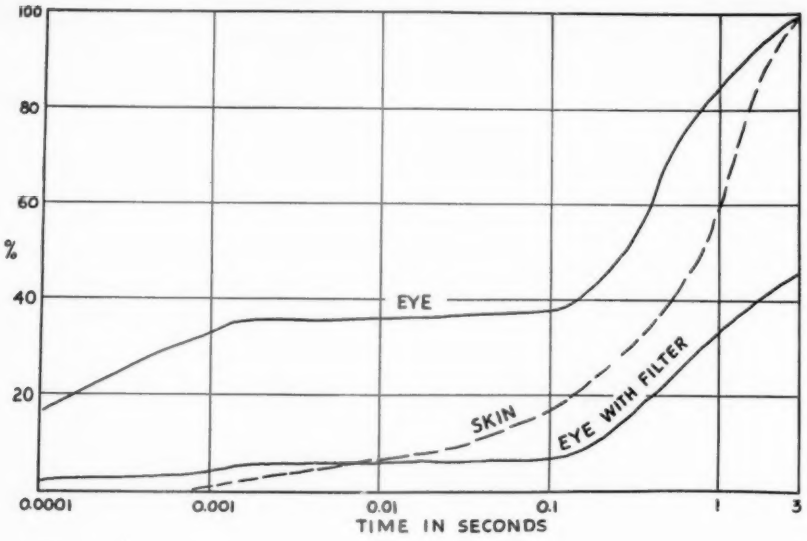

Figure 1

Atomic bomb's radiant heat dose received up to a certain time by (1) a piece of skin, etc.; (2) a small area in the focus behind an optical system; (3) the same as (2) after passage through a yellow filter. The area chosen in (2) and (3) is the image on the retina of the fireball 0.0001 second after start. Doses received up to the end of the bomb's emission are set equal 100, except in case (3) where ordinates coincide with those of (2).

So, the retina and choroid could be damaged at much greater distances.

The calculation of the image diameter is easy. A fireball of 14 m radius (45 ft.) at 17.29 km distance would produce in an average eye having the nodal point at 17.29 mm distance a retinal image of 0.014 mm radius. The consequent burn would cover a substantial part of the fovea if the eyes were properly directed.

To arrive at heat dose data for the above mentioned image we have to integrate, by time, the fourth power of the bomb's temperature multiplied by the emission factor and the attenuation. Through a daylight pupil of 0.4 cm diameter the initial image would receive an irradiation dose of 82g cal/cm² and through a maximum night pupil of 0.8 cm diameter a dose of 300g cal/cm,² if attenuation would not occur.

These doses exceed by far those known to cause heavy skin burns, i.e., about 3g cal/cm.² Part of the initially deposited energy might spread by conduction, thus increasing the afflicted area.

Attenuation from not ideally clear air, reflection and absorption at all layers of the eye will lower these figures.

Annular rings receiving lesser doses would surround the central image since the fireball is known to expand rapidly, thereby losing very fast its high emission temperature.

Any protective step, such as eyelid closing, change of direction, covering

by hands or instruments, takes time. Now, the first peak of extremely strong radiation is reached in less than 1/10,000 second, long before any protective step helps. The figure indicates, in per cent of the possible maximum dose, the amount of radiant heat dose applied to retina or skin, up to a certain moment after explosion. It is, in view of this, irrelevant if the eye is closed after 0.001 or after 0.1 second, more than 30 per cent, or 25g cal/cm^2 have already been deposited.

An orange filter glass, transmitting beyond 600mμ, would take out substantial amounts of the initial radiation which is mainly violet-blue.

The probability of finding remnants of retinal burns is but small. Extrafoveal burns are hard to find and to verify as such. The probability of people in Hiroshima looking in the right direction was less than 1:100,000 for those in the open (solid angle of foveal aperture: area of the sky). Field tests, according to press reports, were conducted at daytime and, consequently, with small pupils. For the distances mentioned for field tests, e.g., 10 miles or 16 km, the hit spot has a diameter of only 14 microns which would cover about 6–10 cones. In view of the permanent small fluctuations of the direction of the eye it would be difficult to state correctly if during a time interval of 1/10,000 second the eye has been properly directed to a 45-foot target 10 miles away.

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BOOK OF REMEMBRANCE

On a shelf in the NSPB library is a handsomely bound volume in which hundreds of names are inscribed. This is the Book of Remembrance.

Over a period of years the Society's memorial gift plan has offered a means of honoring the dead while benefiting the living. Since 1936 many persons seeking a more lasting remembrance than a short-lived floral tribute have observed the custom of sending to the Society a gift in memory of a relative or friend. The name of the person so honored and that of the giver are inscribed in the Book of Remembrance. A memorial message is sent to the bereaved family, advising them of the gift in memory of their loved one. The amounts of all gifts are a matter of confidence. Special blanks and return envelopes are available to all to whom this memorial gift plan appeals as a means of aiding in the work of blindness prevention.

Since the plan was initiated it has proved itself to be a worthy and enduring means of expressing sympathy and tribute, and an interest in helping others.

Many friends of the Society have stated in death notices appearing in various newspapers that "in lieu of flowers, contributions to the National Society for the Prevention of Blindness will be greatly appreciated."

Uveitis and Blindness

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The preventive aspects of uveitis have been given scant attention. In the fight against this sight-destroying disease the combined efforts of the various health and social agencies and a broad program of public education are needed.*

UVEITIS must be given serious consideration as an important factor in blindness because of the large percentage of persons who are now sightless due to this disease. Much of this is because of our inability to make accurate etiologic diagnoses in the majority of cases. The fact that the cause of much uveitis is still unknown, coupled with great uncertainty in the clinical diagnoses, prevents more specific treatment which would prevent much blindness.

Some of the important problems in diagnoses and prevention as well as curative treatment will be discussed in this paper.

Statistical Studies

Canadian studies on blindness by Aylesworth[1] indicate that approximately 14 per cent of the 12,652 children and adults examined cannot see because of uveitis. Studies in the United States by Hurlin[2] show that 11.5 per cent of blindness is attributable to uveitis. In England and Wales, statistical studies by Sorsby[3] revealed that 7.95 per cent are blind as a result of this disease. In Norway, statistics compiled by Holst[4] show 1,596 cases of nonhereditary blindness, 10 per cent of which were attributed to uveitis; and in a survey of 3,181 patients, 8 per cent of all blindness came under this heading. Statistics by Cowan[5] of 31,352 blind eyes in Pennsylvania attributed 11.9 per cent to diseases of the uvea. These included cases of uveitis, iritis, iridocyclitis, kerato-iritis, plastic iritis and cyclitis. An additional 4.4 per cent were diagnosed as choroiditis, 0.8 per cent as traumatic uveitis and 1.2 per cent as traumatic sympathetic ophthalmitis, making a total of 18.3 per cent of blindness caused by inflammations of the uveal tract.

Accurate international statistics concerning uveitis are urgently needed,

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and it is hoped that they may soon become available now that a classification of the causes of blindness has been accepted.[6] It is an encouraging sign that the prevention of blindness activities in the western hemisphere are now being integrated through the International Association for the Prevention of Blindness, the National Society for the Prevention of Blindness, and through the cooperation of Mrs. Harry S. Gradle in the work of the Pan American Association of Ophthalmology for blindness prevention.

Correlation of Diagnoses

Effective prevention of uveitis depends upon exact knowledge of the etiologic agent in individual cases. Adequate statistical information concerning etiologic factors in uveitis can be translated into preventive measures to control these known causes and, when possible, to eliminate them completely. Unfortunately in at least 25 per cent of the cases of uveitis the cause is unknown. This statement is supported by clinical studies and pathologic findings.[7] Furthermore, pathologic studies clearly demonstrate that clinical diagnoses are frequently erroneous.

Comparing the clinical diagnoses of tuberculous uveitis with histologic examination, Guyton and Woods[8] found 36 per cent of 47 eyes to be tuberculous, as against a clinical diagnosis of tuberculous uveitis in 49.7 per cent of 562 eyes. In our series, the incidence was 12.5 per cent according to clinical diagnoses, and 14 per cent by pathologic diagnoses. However, analysis of the data shows a much greater error than these figures seem to indicate. Of 55 eyes clinically diagnosed as tuberculous, the etiology was confirmed by histologic examinations in only 37 instances, revealing an error of almost 35 per cent in the positive clinical diagnoses. Of 61 patients in whom the eyes were diagnosed as tuberculous by histologic examination, the clinical diagnosis was accurate in only 37 instances; an error of over 30 per cent in the negative clinical diagnoses. Of the 79 cases diagnosed either clinically or pathologically as tuberculous, agreement of the two diagnoses was less than 47 per cent, leaving an error of over 53 per cent in the clinical diagnoses.

These figures substantiate Sir Stewart Duke-Elder's contention,[9] long held by us, that clinical diagnoses of uveitis are obviously a matter of faith rather than fact and, as such, useless.

The recent work of Mrs. Wilder[10] throws further distrust upon the clinical diagnoses because even the pathologic diagnoses of tuberculous uveitis previously made in 30 sections of human eyes were found to be erroneous, as the uveitis was actually caused by toxoplasmosis.

General Consideration of Etiology

Determining the exact cause of uveitis is extremely difficult because in many cases several conditions are found which may be causative factors. For example, there may be a positive Wassermann and, coincidentally, foci of infection in the gums, tonsils, sinuses and gall bladder. Theories concerning the common causes of uveitis differ greatly in various schools of thought here and abroad, and a marked change has developed during the past twenty years.

In the granulomatous types of uveitis (brucellosis, sarcoidosis, toxoplasmosis, lymphogranuloma venereum,

syphilis, tuberculosis and certain fungus infections), it is believed that the actual bacteria or causative agents can be found in the eye during the inflammatory stages, especially in the acute stage of the process. In nongranulomatous types of uveitis, however, there is little evidence of the presence of bacteria in the inflamed eye. Occasionally an aqueous culture may be positive as shown by Verrey[11] and Von Sallmann,[12] while cultures made by Hogan and Thygeson,[13] and by us, were all sterile. The reason for this discrepancy may be that Hogan's and our studies were not made sufficiently early in the process to find bacteria. The lack of bacteriologic proof of exact etiology, both clinically and pathologically, in a great many eyes makes the entire subject of the clinical etiologic diagnosis of uveitis most uncertain.

Tuberculous Uveitis

Ocular tuberculosis, which unquestionably accounts for blindness in some of our patients with uveitis, is most difficult to diagnose clinically, because most patients with frank tuberculosis do not have uveal inflammation. Among the criteria for making an etiologic diagnosis are: skin sensitivity to tuberculin; focal reaction to tuberculin and ocular improvement under tuberculin therapy; Roentgen-ray evidence or a clinical history of tuberculosis elsewhere in the body; and, finally, the clinical picture and course of the ocular disease. Unfortunately, none of these findings offers unequivocal proof that the ocular lesion is tuberculous. Even when the diagnosis is made with some certainty, the reaction to treatment is difficult to assess. However, we must not dismiss the diagnosis of tuberculosis too lightly in cases where other etiologic factors appear to be causal.

Preventive measures include all the work being done by the national and local tuberculosis agencies to prevent this disease; and it is evident that organizations for the blind, and for the prevention of blindness, should assume an increasingly important role in activities which prevent tuberculosis.

Sarcoidosis

The etiology of sarcoidosis is unknown, but it is found to be more common in the Negro, and it usually affects both eyes. The serum globulin is usually elevated and the sedimentation rate and blood calcium content are usually increased. Anergy to tuberculin is common and occasionally there is a moderate eosinophilia. Negative biopsies do not eliminate the possibility of sarcoidosis especially where there is a disturbance in the albumin-globulin ratio and other systemic evidence of sarcoidosis.

Sarcoidosis of the eye is similar in appearance to sarcoid elsewhere in the body and will affect almost any of the ocular structures. It has been estimated that approximately 50 per cent of ocular sarcoidosis affects the uveal tract and that 45 per cent of all sarcoid patients show eye symptoms.

A study of 562 patients by Guyton and Woods in 1943 showed that only 3 out of 244 patients with definite evidence of etiology of uveitis had sarcoid, and that none of the 318 patients with presumptive evidence of etiology revealed any evidence of sarcoidosis.

Prevention: Until the cause of sarcoidosis is known, no specific measures can be taken to prevent blindness from this cause.

Syphilis

The etiologic diagnosis of syphilitic uveitis is usually based upon one or more of the following criteria. A positive Wassermann reaction, characteristic findings in the spinal fluid, a history of syphilis, a favorable response to anti-luetic therapy, the Jarisch-Herzheimer reaction and the clinical picture of the ocular disease. Unfortunately, none of these criteria establishes definite proof of the etiologic relationship of syphilis to the uveal lesion. A negative Wassermann test is often recorded in late treated cases, but is usually positive in early untreated cases of syphilitic uveitis. Furthermore the comparison of the clinical with the pathologic findings discussed above discloses that at least in the United States the clinical diagnosis is in error in 50 per cent of the cases. In ocular syphilis there is no clinical test which will demonstrate with certainty the hypersensitivity of the syphilitic patient. The degree of allergy is not indicated by the complement fixation or precipitin tests.

The ocular manifestations of syphilis in the uveal tract include granulomatous iritis which is seen in approximately 5 per cent of the cases in early syphilis of the acquired type, and in approximately 8 per cent of the cases in secondary syphilis of the recurrent type.

Uveitis is observed in about 2.5 per cent of cases of late syphilis and blindness may result from glaucoma or secondary cataract if early adequate treatment is not instituted. Diffuse and disseminated choroiditis may be seen in acquired and in congenital syphilis, and the differential diagnosis from posterior uveitis, caused by other etiologic factors, is often difficult if not impossible, from the clinical appearance alone. Iridocyclitis of a fairly mild chronic type is a rather common finding in syphilitic individuals.

Prevention: As with tuberculosis, agencies for the blind and especially organizations for the prevention of blindness must do everything possible to further the great work of the prevention of syphilis. They should continue to cooperate closely with the American Social Hygiene Association, which has done such outstanding work nationally, and must lay more stress on prevention of uveal lesions of syphilis in addition to interstitial keratitis.

Social service can be most helpful, and the following suggestions should be considered[14]: The interpretation of the disease in its relation to the eyes and the need of prolonged treatment by the syphilologist should be made clear to the patient or his guardian by the social service worker. During the long period of treatment she may assist in sustaining the morale of the patient, in improving his hygiene, and by offering suitable opportunities for education to children whose vision is already affected. When syphilis is found in one member of a family, serious complications may sometimes be prevented in other members of the same family by studies of their blood.

Gonorrheal Uveitis

The diagnosis of gonorrheal uveitis which is of the nongranulomatous type is difficult because there is no typical clinical picture and the etiologic diagnosis usually must be based on a past or present gonorrheal infection. If the first attack of uveitis occurs during an

attack of gonorrheal arthritis, as it often does, this is strong presumptive evidence of the probable gonorrheal etiology. Also the precipitation of an attack of uveitis produced by massaging the prostate is highly suggestive evidence.

Nothing characteristic has been observed in the ocular manifestations of gonococcal uveitis, although spongy exudates have sometimes been seen in the anterior chamber which have been considered somewhat characteristic.

Brucellosis

Any of the three species of *Brucella —abortus, suis or melintensis*—may cause ocular manifestations in the acute or chronic infection. The diagnosis of the chronic illness, however, is usually presumptive and is based upon the history, agglutination and cutaneous sensitivity tests, and complement fixation and opsonocytophagic reaction since rarely is there a bacteremia except during acute exacerbations.

The clinical picture and ocular symptoms of chronic brucellosis (afebrile or accompanied by low-grade fever) are not characteristic. The general symptoms include the usual complaints of fatigue, malaise, joint and muscle pains, in addition to symptoms referable to any of the systems.

The ocular manifestations include phlyctenular conjunctivitis, keratitis, corneal ulcers, iritis and iridocyclitis, optic neuritis, retrobulbar neuritis, chorioretinitis, panophthalmitis and extensive ocular muscle palsy.

Diagnosis is made on the basis of a battery of tests such as blood culture, agglutination tests, the opsonocytophagic reactions and skin tests.

In a study of 562 cases of uveitis by Guyton and Woods (1943), the cause was attributed to brucellosis in 0.4 per cent of these, 0.2 per cent had a definite etiology and 0.2 per cent had a presumptive one. In an unpublished study by Berens and Nilson of 170 cases of uveitis, definite association with brucellosis was found in 0.95 per cent of the cases.

Local treatment is similar to that employed for other patients with uveitis, and glaucoma may develop.

Prevention: Every effort should be made by agencies for the prevention of blindness to insure that milk and milk products are properly pasteurized. Avoidance of contact with infected goats, hogs and cattle is equally important. The public should be warned of the dangers of chronic brucellosis to the eyes, and informed of modern methods for preventing brucellosis. General practitioners and internists and all organizations dealing with the blind and those interested in the prevention of blindness should be informed by ophthalmologists concerning the eye conditions associated with brucellosis. The early diagnosis of *Brucella* infection, before irreversible damage is done, would seem to be the best method of preventing ocular damage.

Toxoplasmosis

Toxoplasmosis in humans is more widespread than is generally recognized, and has been found to occur in three different forms, each depending upon the age of the patient: congenital, childhood acquired and adult acquired. Interest in toxoplasmosis as an important cause of uveitis has been stimulated by Wilder[10] who found toxoplasmosis in pathologic sections of 53 adult eyes, and by Thygeson and Hogan[15] who found four probable

cases of toxoplasmosis in adult human eyes.

It is of historical interest that in the first case of human toxoplasmosis reported (Janku, 1923) the child had involvement of the eye.

Pathogenesis: An acute infection with toxoplasma may produce symptomatic visceral and central nervous system lesions in fetuses, infants and occasionally in children and adults.

With the development of neutralizing antibodies the visceral lesions subside and most organisms disappear. Sometimes toxoplasma may persist in such tissues as the heart and skeletal muscles and especially in the central nervous system and the eye. These persisting organisms are the cause of subacute fetal and infantile toxoplasmic encephalitis, with the characteristic periventricular lesions. They may also give rise to fetal and infantile toxoplasmic chorioretinitis and anterior uveitis. In older children and adults exhibiting a high degree of resistance a subacute type of infection has less commonly been observed and parasitological cure may occur.

Chronic infection probably occurs and it is usually asymptomatic, although reactivation is possible. The term "chronic" toxoplasmosis has been introduced to explain the symptoms of a group of patients with recurrent active chorioretinitis in whom dermal hypersensitivity to toxoplasmin and antibodies to toxoplasma were present.[16]

Diagnostic aids include: Roentgen-rays of the skull which often reveal abnormal areas of calcification in the brain. Culture of the organisms, the complement fixation test, the Sabin-Feldman dye test and the skin test. A changing dye titre is considered to be of special importance.

Prevention: As the mode of acquiring toxoplasma infection is not known, little can be said as to prevention. Some household pets and several types of wild animals are known to be subject to this disease. Considerable research must be carried out in this field.

According to Kean,[17] no case is known (over one hundred have been studied) in which a woman having given birth to a toxoplasmic infant has, on subsequent pregnancy, had another child with this disease.

Focal Infection

The theory of focal infection was first introduced by Hunter in 1901 and elaborated by Billings in 1910 to 1916. It was soon evident that this theory seemed to explain the cause of some uveal inflammations. In the absence of any external ocular inflammation or injury of the eye it was postulated that organisms or their toxins were transmitted by the circulation to the interior of the eye. Organisms recovered by Rosenow from apical abcesses of persons suffering from iritis produced iritis in rabbits upon intravenous injection. The first comprehensive report on an etiologic survey of foci of infection in iritis was made by Brown and Irons in 1915. Since then many such surveys have been reported with special mention of the teeth, tonsils, sinuses and pelvic organs as the sites.

Some of the reasons for believing that primary foci caused secondary systemic and focal diseases of the eye follow: (1) removal of infected teeth or tonsils occasionally causes improvement of iritis; (2) occasionally transient bacteremias are found in indi-

viduals with endocarditis; (3) small primary foci are found when there is no other cause such as syphilis or tuberculosis; (4) bacteria often found in primary foci are occasionally recovered from the aqueous; (5) serobacteriologic reactions and skin tests furnish suggestive evidence pointing to a certain organism as a probable focal invader.[18]

Reasons given against the theory of focal infection: (1) organisms or toxins have rarely been isolated from the uveal tissues, except in frank pyogenic inflammations; (2) foci of infection in apparently healthy individuals are common; (3) elective localization of organisms has gained little scientific support; (4) experimental production of iritis and choroiditis has often been unsuccessful except when the uveal tissues have been previously sensitized. The latter procedure has been more successful.

Thus the theory of focal infection can be considered to include a mechanism of sensitization from remote foci with recurrent activation. This would explain the initial inflammation as well as recurrences.

In spite of the lack of absolute proof of the theory of focal infection in man, it seems likely that there is a group of endogenous ocular inflammations produced by sensitization of the uveal tract or other ocular tissues, possibly to relatively innocuous organisms, which may later be activated by bacterial products or by the bacteria themselves.

Ophthalmologists are deeply interested in recurring attacks of iritis, iridocyclitis and chorioretinitis, because of the high incidence of blindness which results from these inflammations.[19] That the tissues of the eye of experimental animals can become sensitized to bacteria, either by repeated injections of the organisms or with agar implants, has been known since the work of Derick and Swift in 1928.[20] These facts have been confirmed by Brown[21] and others.[7,8] Even *Corynebacterium xerose*, which is ordinarily considered nonpathogenic, can produce pathologic effects. The association of iritis with sensitization seems to be borne out by the fact that long after the specific antigen can no longer be found in the aqueous, the lesion may be reactivated by an intravenous injection and the aqueous may again contain the specific protein.[22] In working with uveitis in relation to arthritis,[7] it was noted that sometimes an organism (alpha hemolytic streptococci and beta hemolytic streptococci) would not produce intraocular inflammation following a single intravenous injection, even though the bacteria were present in the choroidal vessels of the animals. However, inflammatory lesions were produced by repeated injections of the living organisms but not with filtrates, or with the carbohydrate or protein fractions of these bacteria. Uveitis in animal eyes resulted from the intravenous injection of cultures of living streptococci in animal eyes previously "immunized" with formalin-killed streptococci.[23]

The great variation in the proportion of cases of uveitis attributed to the different infections by various authors indicates the complexity of this differential diagnostic situation. In France anti-syphilitic treatment is administered for most uveal lesions, even when little evidence of syphilis exists. In Germany uveitis patients are more often treated for tuberculosis; whereas in England the foci of

infection are usually considered as causal. In the United States some groups remove or treat foci of infection, others prescribe for syphilis and tuberculosis and many merely treat symptoms and administer antibiotics and sulfonamides, usually without prior bacteriologic investigation.

Prevention: Agencies for the prevention of blindness should call the public's attention to the high incidence of blindness from uveitis. The possible role of infection from the teeth, gums, paranasal sinuses, tonsils and other sources of focal infection in these inflammations should be pointed out.

Virus Diseases

Both *herpes simplex* and *herpes zoster* are known to cause uveitis, and recently the causative factor in Behçet's disease has been demonstrated.

Prevention: Effective preventive measures against virus uveitis must await further elucidation of etiologic factors. However, it is likely that with the development of vaccine for the prevention of influenza and possibly other virus diseases, the incidence of uveitis from virus infections may be reduced.

Sympathetic Ophthalmitis

The onset of sympathetic uveitis usually ranges from two weeks to three months following a perforation of the globe which involves the uvea, resulting in plastic uveitis tending toward glaucoma and phthisis bulbi.

Prevention: The danger of sympathetic ophthalmitis should continue to be publicized in spite of the fact that modern treatment seems to save many sympathizing eyes with or without enucleation of the injured eye.

Summary

National and international statistics reveal that approximately 15 per cent of the blind children and adults examined lost their vision because of uveitis caused by tuberculosis, syphilis, gonorrhea, sarcoidosis, toxoplasmosis, brucellosis, focal infection, virus diseases, sympathetic ophthalmitis and several other rarer causes.

Correlation of the clinical and pathological diagnoses of uveitis clearly demonstrates that the clinical diagnoses are frequently erroneous. The incidence of syphilitic uveitis was confirmed pathologically in only 42 per cent of the cases, showing an error of 58 per cent in the clinical diagnoses. Similar disagreement was found in the clinical and pathological diagnoses of tuberculosis, where an error of over 53 per cent was found in the clinical diagnoses. A recent study also revealed an error in the pathologic diagnoses of tuberculous uveitis made in 30 pathologic sections of adult human eyes, which were found to be uveitis caused by toxoplasma.

Statistics concerning the common causes of uveitis differ greatly, and many authorities claim that the etiology is impossible to determine in at least 25 per cent of the cases. Even when the clinical diagnosis is made with some certainty the effect of treatment is often difficult to evaluate.

The etiologic diagnosis of gonorrheal uveitis must be based to a great extent upon past or present gonorrheal infection, since little reliance can be placed on the complement fixation and intradermal tests, and there is nothing characteristic in the ocular manifestations of this disease.

The clinical picture and ocular symptoms of chronic brucellosis are not

characteristic and because the only conclusive test is culture, which is usually negative, the entire battery of tests which include agglutination reaction, complement fixation test, blood culture, opsonocytophagic index, intradermal reaction and sedimentation rate, must be instituted in the attempt to make a more accurate diagnosis.

Human toxoplasmosis is apparently more widespread than is generally recognized and this fact has been confirmed pathologically by Wilder's study of 53 adult eyes referred to above. The skin test for toxoplasmosis is of little diagnostic value but the methylene blue dye test is a useful aid in the diagnosis of all stages of toxoplasmosis.

Uveitis caused by focal infection continues to be a most controversial subject as indicated by the writings of various authors and the continued study of this important subject is imperative in the effort to determine the exact etiologic diagnosis of uveal inflammations. It is sometimes difficult if not impossible to remove even the primary source of infection in patients who have chronic sinusitis, and sometimes problematical in oral infections.

Research studies on viruses and other organisms as etiologic agents in uveitis should be continued. It is evident that knowledge of virus infections of the eye, particularly of the endogenous type, is in its infancy, but that these infections probably represent one of the most important unsolved problems in uveitis.

Attention is drawn to the proposition that the danger of blindness from sympathetic ophthalmitis should continue to be publicized and that the importance of prevention should be stressed. This plan of action is suggested even though newer treatments seem to save some sympathizing eyes which formerly would have been enucleated.

Measures for preventing several diseases now known to cause uveitis are discussed and the importance of the close cooperation of organizations interested in preventing blindness with those working to prevent tuberculosis and venereal diseases is stressed. Measures which may aid in preventing uveitis caused by brucellosis, toxoplasmosis and virus diseases are briefly outlined.

In the fight against blindness from uveitis it is urged that the combined efforts of the various health and social agencies and education of the public concerning diseases known to cause blindness from uveitis be accelerated.

Conclusions

The preventive aspects of uveitis, which causes much blindness, have been accorded scant attention.

Methods of preventing blindness from uveitis deserve intensive study by all local, national and international agencies interested in the problem. International statistics on uveitis, with special emphasis on pathogenesis, should be compiled and studied.

With these data available, great stress should be placed on research regarding the causes of uveitis and more accurate methods of making etiologic diagnoses.

If these goals are accomplished, preventive and curative measures will be more specific and effective and much unnecessary blindness will undoubtedly be prevented.

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Glaucoma Case Finding in Philadelphia

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In this screening of 10,000 working people for chronic simple glaucoma by the Philadelphia Committee for Prevention of Blindness more cases were found in the older age groups. Such cases are likely to be advanced. The need for more study and long-term follow-up of "borderline" cases is evident.*

At least one-eighth of the blindness in the United States is caused by glaucoma, according to some estimates,[1] and with the aging of the population it is probable that this condition will increase in importance. Although there is general agreement among ophthalmologists that the most important factor in the management of chronic simple glaucoma is its early detection, only one mass case-finding campaign has been reported in detail, that of the Philadelphia Committee for Prevention of Blindness.

From 1944 through 1950, the period covered by this report, a total of 10,000 persons was screened, the majority during the fiscal year 1950, when the Public Health Service supported the committee's work. Earlier papers by the executive director of the committee and by ophthalmologists who took part in the case-finding procedure have described the background, methods used, and results of the Philadelphia program.[2,3] This paper presents a detailed description of the population screened, the initial tonometer readings, and the case-finding yield at various tonometer readings above the screening level.

* Reprinted by permission of the Public Health Service from the November 1953 issue of PUBLIC HEALTH REPORTS, pp. 1059-1064.

Screening and Retesting Examinations

The screening examination, which was performed by certified ophthalmologists, included external examination for gross pathology, ophthalmoscopic examination of the fundus, visual acuity tests, and intraocular tension readings, using calibrated Schiøtz tonometers and a modification of the Schiøtz conversion chart.[4] After these procedures ran smoothly, people were examined at the rate of 20 per hour. The screening tests were conducted in the plants where the screenees worked.

As has been found desirable in other mass case-finding programs, persons with positive screening results were retested before being referred to private physicians. Criteria for retesting were, in general, suspicious clinical findings or tonometer readings of 25 mm. Hg. or more. The glaucoma screenee who returned for recheck might be classified as negative after a second or third tonometer reading; or before the examining physician de-

cided upon a negative diagnosis or referral to a private physician, the screenee might have his fields of vision charted or a water provocative test or gonioscopic examination performed.

The retest clinic provided an additional service. Persons with borderline symptoms—persistent or intermittent tonometer readings of 28 to 30 mm. Hg. and/or a rise of 6 to 8 mm. Hg. on the Marx water-drinking test—were followed until a diagnosis of glaucoma could be established or ruled out. There were 71 such cases when they were classified in 1951.[3] In addition, there were 100 "observation" cases, persons with no indication of glaucoma except slightly to moderately elevated intraocular tension, a difference of 4 mm. or more in tension readings between eyes, or a family history of glaucoma. These were kept under observation until they had remained symptom-free for several years or had developed additional symptoms.

Some persons with very high tonometric readings and suspicious clinical findings were referred immediately to private ophthalmologists or to clinics. Diagnoses were obtained for these patients. Very few who were advised to have a tonometric recheck or further examination refused. Only 19 persons were lost from the study.

Persons Screened

The group screened, although numbering fully 10,000 persons, is admittedly not a representative sample of the population of Philadelphia. For example, those not employed on account of age, sex, poor vision, or other reasons were not represented since the program covered only employees of firms who cooperated in the study. Included among the 10,000 were 215 department-store shoppers who were screened as a demonstration. The other 9,785 persons were known to be working in factories, stores, or government installations when they were first tested (table 1).

The screenees were predominantly white (90 per cent), as is the population of Philadelphia (87 per cent white). Fifty-seven and one-half per cent were white males and 32.3 per cent were white females. There were

TABLE 1

Number and percentage of employed persons screened for glaucoma, by sex and age groups, in relation to the total population of Philadelphia[1]

Age Group	Total Population		Number of Persons Employed		Persons Screened[2]			
					Number		Per Cent of Employed	
	Male	Female	Male	Female	Male	Female	Male	Female
All ages, 35 years and over	463,300	516,200	358,900	153,000	6,496	3,457	1.81	2.26
35–44 years	145,900	173,700	127,400	64,500	1,830	1,176	1.44	1.82
45–64 years	239,900	248,000	198,200	80,300	4,399	2,173	2.22	2.71
65 years and over	77,500	94,500	33,300	8,200	267	108	.80	1.32

[1] Bureau of the Census: 1950 Census of Population Preliminary Reports, Series PC-5, No. 36, Aug. 29, 1951.

[2] 47 screenees under age 35 omitted from this table.

about three times as many nonwhite males as nonwhite females. On the other hand, comparison of the number of screenees with the number of Philadelphia residents of each sex employed in April, 1950 indicates that a slightly higher percentage of female (2.3) than of male (1.8) employees were included among those screened for glaucoma. The relatively greater coverage of female workers was true of each of the broad age categories and was pronounced among employees 65 years of age or older.

Attempting to reach the group most likely to have glaucoma, the committee concentrated on people over 35 and discouraged younger persons from entering the screening line. People are less likely to be employed after they reach 65 and, of the individuals within that age bracket employed in Philadelphia, relatively fewer were included among the screenees. Therefore, most of the screenees were between 35 and 65 years of age.

Intraocular Tension Readings

Tonometer readings for both eyes were reported for 9,645 persons. The distribution of initial tonometer readings in the eye with highest tension, expressed in millimeters of mercury, is illustrated in figure 1. Since no attempt was made to smooth out irregularities, a tendency for certain readings to appear more often than adjacent ones is apparent. This is a familiar phenomenon to anyone acquainted with other measurements which result from translating, according to a calibration chart, the positions of a wavering pointer on a small scale.

To illustrate, more than one-fifth (22 per cent) of the group tested had initial tensions of 22 mm. Hg., the modal, median, and mean reading for the eye with the highest tension. On both sides of this peak, there were fewer readings than would be expected in a normal distribution. For only 322 persons was the initial high tension given as 21 mm. Hg. On the right-hand side of the mode, the slope is more regular but there are only 3 mm. between the modal value and 25 mm. Hg., which was adopted as the screening level. The wide and one-sided range at the base, from 11 to 65 mm. Hg., with a few high values representing the more abnormal or unusual occurrences, is also characteristic of measurements of blood pressure, blood sugar, or hemoglobin.

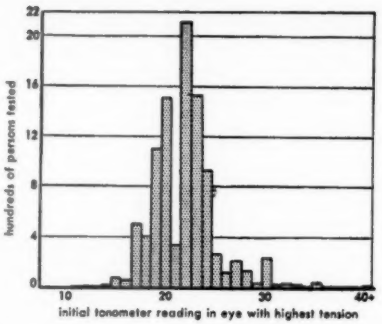

Figure 1. Number of persons tested by initial tonometer reading (in mm. Hg. Schiøtz).

Of the 9,645 persons with tonometer readings for both eyes, 1,056 (11 per cent) had intraocular tensions in one or both eyes equivalent to 25 mm. Hg. or more, the screening level which had been adopted. Of these, 815 were called back for re-examination or put under medical care. Glaucoma or "borderline" intraocular tension was diagnosed in 21.2 per cent of the 1,056 suspects with initial tensions of 25 mm. Hg. or more, or 2.2 per cent of the total number screened. Virtually

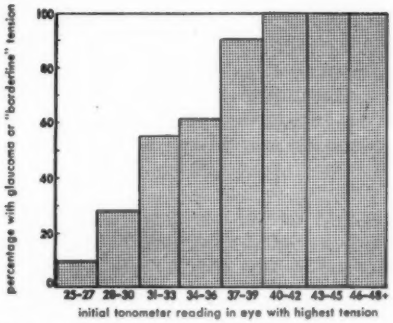

Figure 2. Percentage of persons with confirmed glaucoma or "borderline" intraocular tension who had initial tonometer readings (in mm. Hg. Schiøtz) of 25 or more.

none of the glaucoma patients had any previous knowledge of their disease.

In figure 2, tension readings above the screening level of 25 mm. Hg. have been grouped in 3 mm. intervals. Even in the first interval, among those with initial readings of 25 through 27 who were retested, 10 per cent (32 cases) were classified as having glaucoma or "borderline" tensions. With higher initial readings, the percentage of positive classifications increased. Original tonometer readings of 40 mm. Hg. Schiøtz or higher were followed in all instances by diagnoses of glaucoma.

It should be noted, though, that the cases picked up at the 40 mm. Hg. Schiøtz screening level numbered only 20, compared with 32 instances of glaucoma or "borderline" intraocular tension with initial readings of 25 to 27 mm. Hg. and 90 at the 28 to 30 mm. Hg. level. Moreover, all but one case with initial tensions of 40 mm. Hg. or more were later classified as advanced glaucoma, while 95 cases (78 per cent) with original tensions of 25 to 30 mm. Hg. were either early glaucoma or "borderline" intraocular tension. (See figure 3.)

Age and Intraocular Tension

With age there is an increase in the percentage diagnosed as having glaucoma or "borderline" intraocular tension, as may readily be seen in table 2.

If all cases are grouped together, and distributed by their age, their ratio to the total number of persons screened rises until age 65 and then levels off. For advanced glaucoma, however, this ratio continues to rise rather steeply after age 65 (figure 4). Early glaucoma and "borderline" intraocular tension were found only slightly more frequently in the older age categories, and the percentage drops after age 65. On the other hand, relatively more "borderline" and early cases than advanced were found in the 35-to-44-year age group. Among the persons with glaucoma who were 55 or over, a larger number were classified as advanced than as early or "borderline," and among those 65 or over, 64 per cent had glaucoma in an advanced stage.

Since the program was specifically designed for persons 35 and over, no data are available to show the possible

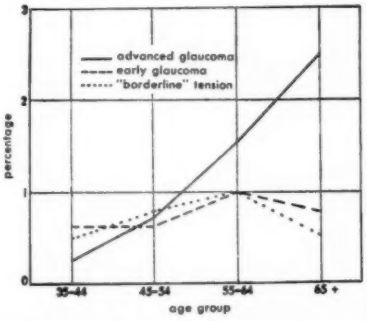

Figure 3. Number of persons with glaucoma or "borderline" intraocular tension, by initial tonometer reading (in mm. Hg. Schiøtz) and by stage of glaucomatous findings.

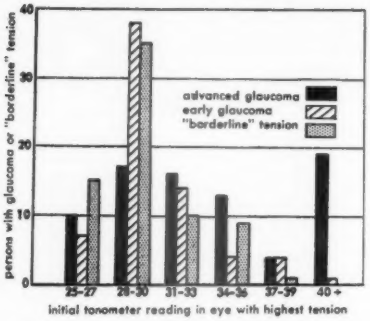

Figure 4. Percentage of persons diagnosed as having glaucoma or "borderline" intraocular tension, by age group and stage of disease.

results of screening persons under 35. Within age groups, statistical tests show no significant difference by race or sex.

Fundus Examination

By careful fundus examinations in the Philadelphia screening, ophthalmologists discovered one patient with initial tension readings of 15 and 17 mm. Hg. who was later diagnosed as having glaucoma. All other "suspicious fundus" cases eventually diagnosed as glaucoma had initial tensions of 25 mm. Hg. or more.

However, mass screening is not directed toward "low tension" glaucoma, called by some authorities pseudoglaucoma.[5] There is considerable evidence that this is not primary glaucoma at all; if and when it is, the manifestations are different. The number of cases of "low tension" glaucoma is relatively unimportant compared with chronic simple glaucoma, for which a higher than average tension is the earliest symptom.[6,7]

Nor is mass screening directed toward types of glaucoma which may be detected during acute attacks.

Readings for Right and Left Eyes

Consistently, in almost every sex and age group, the eye more frequently having the greatest tension was the left. However, distributions of tensions for the two eyes are similar, although more left eyes have higher readings near the modal value. Whether this results from an inherent biological phenomenon or from the

TABLE II

Number and percentage of screenees by age groups classified as having glaucoma or "borderline" intraocular tension

Age Group	Persons screened	Persons classified as having glaucoma or "borderline" intraocular tension		Persons diagnosed as having glaucoma, by type				"Borderline" intraocular tension	
				Advanced		Early			
		Number	Per Cent	Number	Per Cent	Number	Per Cent	Number	Per Cent
All ages, 35 years and over	10,000	224	2.2	84	0.8	69	0.7	71	0.7
Under 35 years	47	0	..	0	..	0	..	0	..
35–44 years	3,006	35	1.2	7	.2	17	.6	11	.4
45–54 years	4,183	90	2.2	31	.7	25	.6	34	.8
55–64 years	2,389	85	3.6	37	1.5	24	1.0	24	1.0
65 years and over	375	14	3.7	9	2.4	3	.8	2	.5

TABLE III

Number of persons examined and number and percentage classified as having glaucoma or "borderline" intraocular tension, by tonometer reading in eye with highest tension and by difference in tension between eyes

Tonometer reading (mm. Hg.) in eye with highest tension	Difference in tension between eyes (mm. Hg.)	Number of persons examined	Persons classified as having glaucoma or "borderline" intraocular tension	
			Number	Per Cent
Less than 25	All	8,567	4	0
	00–01	6,662	2	.0
	02–03	1,692	1	.1
	04–05	171	1	.6
	06+	42	0	..
25+	All	968	217	22.4
	00–01	410	91	22.2
	02–03	305	48	15.7
	04–05	133	30	22.6
	06+	120	48	40.0
Total with known tension and classification	..	9,535	221	2.3
Unknown tension in one or both eyes or not classified	..	465	3	..
Total	..	10,000	224	..

specific mechanics of the testing situations is not known.

As compared with criteria based on the height of intraocular tension readings, the difference between the tension readings in the two eyes proved to be of no value in case finding. (See table 3.) One glaucoma case without elevated tension on the screening test may have been suspected on the basis of a 5 mm. Hg. difference between the readings for the right and left eyes. On the other hand, for more than a third (36.2 per cent) of the glaucoma or "borderline" patients who had tension readings for both eyes, no difference was found. Almost two-thirds (64.3 per cent) had readings within 3 mm. Hg. of each other for the two eyes—a difference which some investigators have stated to be within the margin of error.[3,8] Judging from the data available, suspicion aroused by high intraocular tension may well be strengthened if there is a difference of 4 mm. Hg. or more between eyes, but the latter alone cannot be considered as a case-finding device.

Discussion

How many glaucoma cases might have been found by rechecking persons whose eyes had initial tension readings of 24 mm. Hg.? Retests were made on some screenees (an unknown number) who had initial tensions of 24 mm. Hg. in both eyes, and two of these persons had glaucoma—advanced in one case. Undoubtedly, rechecking all eyes which had 24 mm. Hg. tensions would have increased the effectiveness of the case-finding program, but at considerable cost. There were 884 persons with initial readings of 24 mm. Hg. in the eye with highest tension, compared to a total of 1,056

with tensions of 25 mm. Hg. or higher. Thus, lowering the screening level one point would have almost doubled the group subject to recheck, which would have been impractical for a case-finding project operating on a very limited budget.

There is a need for a specially designed project in which every one of a representative group of adults, including those with negative findings,would have repeated tonometer tests, provocative tests, visual fields charted, gonioscopic examination, and diagnosis. For those with "borderline" tonometer readings and negative diagnoses, the tests should be repeated at intervals. Investigation is needed before we can estimate how elevated tension must be to be regarded as dangerous. Such a study would furnish a basis for estimating the number of those who might be inaccurately classified as negative in a mass screening survey. These data would enable us to compare "borderline" screening levels for sensitivity as well as specificity.

Further investigation of screening methods is fundamental to a public health approach to this problem. Although without some count of the "false negatives," we cannot accurately estimate the size and cost of the problem of undiscovered glaucoma, we know that it is large and expensive. The cost of services to the blind paid from taxes or privately donated funds has been estimated to be in excess of $125,000,000 per year.[1,9] This sum does not include expenditures by relatives or by blind persons themselves. Nor does it include the costs of unemployment caused by blindness or any of the economic costs of partial vision.

Summary

Among 10,000 working people screened for chronic simple glaucoma by the Philadelphia Committee for Prevention of Blindness, no differences in frequency were found by race and sex, within age groups. More cases of chronic simple glaucoma are found in the older age groups; these cases are likely to be advanced.

The higher the intraocular tension, as indicated by a Schiøtz tonometer reading, the more specific is the indication of glaucoma, especially of advanced glaucoma. On the other hand, the "borderline" tension levels are most productive of "borderline" cases.

The need for more study, with emphasis on long-term follow-up of "borderline" cases, is evident from the data.

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Lasker Award to Dr. Wald

In recognition of his outstanding achievements in explaining the chemistry of vision in man, George Wald, Ph.D. of Harvard University has been named a 1953 winner of a Lasker Award.

Cited at a recent ceremony in New York as a scientist who has given mankind "a new picture of one of the most treasured gifts of life—the capacity to see," Dr. Wald also was acclaimed for his broad range of interest. This was characterized as a "delightful penetration into comparative biochemistry, evolution, ecology, the essentials of good teaching and a keen appreciation of the art of living on a high plane." His discoveries have been especially valuable in identifying specific reversible reactions within the eye in response to light. Visual purple and other compounds were thus related to vitamins A_1 and A_2, and these in turn were associated with the early sea or fresh water environment of the organism.

Dr. Wald's basic training at New York University and Columbia University was followed by a National Research Council fellowship for advanced study in Berlin, Heidelberg, Zurich and Chicago. Since 1934 he has been a member of the faculty at Harvard University, in the department of biology.

For some time Dr. Wald has served as a consultant to the National Society for the Prevention of Blindness, as has Felix J. Underwood, M.D., state health officer of Mississippi, another 1953 Lasker Award winner, who was cited "for demonstrating how a long-sustained, sound and expanding pattern of public health services benefits a people."

Also named for awards were Dr. Hans A. Krebs, professor of biochemistry at the University of Sheffield, England; Dr. Michael Heidelberger, professor of immunochemistry at Columbia University and, posthumously, Prof. Earle B. Phelps, research engineer at the University of Florida. Organizations receiving similar honors were the division of research grants, National Institutes of Health; and the University Laboratory of Physical Chemistry Related to Medicine and Public Health, at Harvard.

The Lasker Awards have been given for eight years and are considered among the nation's highest medical honors.

Sight Conservation in Foundries

The report of a survey made by NSPB in cooperation with the Gray Iron Founders' Society is now available. Contact was made with 1,300 foundries in this study. Sight conservation facilities and practices affecting the industry's workers were studied. The report includes recommendations on eye protection standards and operating practices. NSPB publication No. 128; price 30 cents.

Regret Won't Prevent Accidents

"IT should not have happened!" This exclamation so often heard following an accidental injury indicates that carelessness, thoughtlessness or inattention was the cause, and that the accident might easily have been prevented.

This point was emphasized by Dr. George F. J. Kelly of the department of ophthalmology, University of Pennsylvania,[1] before the Second Annual Eye Institute of the Berks County Association for the Blind, Inc. held in Reading, Pa. Dr. Kelly described some of the eye injuries that have come under his observation in the course of years. For example, the case of the three-year-old girl whose eye was penetrated by a fork thrown across the table by her brother. Another involving three boys who while playing together found a can containing lime. They attached a string to the can and as they whirled it about some water came in contact with the lime, causing an explosion. The eyes of all three boys were burned and two eyes were completely lost as a result of this accident.

An unusual case involved a physician who had an electric fan on the floor of his office. As he prepared to give an injection to a patient the needle of the hypodermic syringe dropped from his hand. It fell into the whirling fan and was propelled forward into his left eye. The eye was badly torn and had to be removed.

"This accident so impressed me," said Dr. Kelly, "that I have a horror of seeing an electric fan on any floor."

Dr. Kelly explained that the three main groups of eye injuries are contusions; lacerations and penetrations; burns or chemical damage. Since only the lids and lashes protect the eye in front, below, and on the outer side, most injuries occur in these areas.

Among the offending objects mentioned in connection with eye accidents were doors of closets and cars left ajar; garden rakes left carelessly on the lawn; pointed ornaments or feathers on women's hats; pointed leaves on plants; pinwheels, various sharp or pointed toys, firecrackers, air rifles, BB guns and arrows in the hands of children. The fingernails of babies often cause serious damage to the cornea because parents fail to cut the nails. Similar corneal injury is frequently inflicted by carelessly opening a newspaper.

Chemical Injuries

Chemical accidents and burns cause injuries which are often so similar that they may be considered together. Explosions usually result in external damage—the eyebrows and lashes may be singed, or the skin of the lids may be burned—but the eyeball often escapes injury since the sound of the explosion stimulates the lids to close

[1] Associate professor of ophthalmology, Graduate School of Medicine, and associate prof. of ophthalmology, School of Medicine.

automatically, protecting the underlying structure. When a chemical solution enters the eye, however, the same automatic closure of the lids, instead of affording protection, promotes further damage. Chemical injuries may be acid or alkali; both cause burns. Alkaline burns are usually more serious than acid burns, and they tend to become worse two or three days after the initial injury. Lime burns are in this category. The use of wrong medication because of mislabeled bottles, or because the label is missing or misread, is a frequent cause of accidents. In cases of acid or alkali burns, the eye should be irrigated for a prolonged period with dilute salt solution or clean water.

Allergic Responses

Allergic responses such as irritation and inflammation of the conjunctiva and eyelids may be evoked by dyes, cosmetics, and similar substances. Knowledge and caution are necessary in handling these. Irritation of the conjunctiva and retina may result from viewing an eclipse with inadequate eye protection.

Many eye injuries occur in sports activities. Dr. Kelly recalled the case of a golfer who stood too close to another player when taking a practice swing. The head of the golf club hit the other player with great force. Not only was one eye destroyed but the orbit was so ruined that only prolonged, trying plastic surgery enabled the man to wear an artificial eye.

Discussing foreign bodies in the eye Dr. Kelly warned that removal of these by an unskilled person could be dangerous. "One might flush the eye with normal salt solution—a half teaspoonful to a glass of water—or boric acid solution," he advised. "This sometimes will dislodge the foreign body. If it does not, better seek professional treatment."

A contusion about an eye is usually associated with considerable swelling and infiltration of blood into the tissues. Because of the looseness of the tissues both of these signs are prominent and the so-called black eye results. If seen early cold compresses are in order. Beefsteak and tea leaves are relics of the dark ages, have no value and should not be used.

When an eye has been burned by acid or alkali frequent prolonged irrigation with a non-irritating solution such as normal salt solution is recommended. If one cannot obtain this the eye should be irrigated with ordinary clean water. Theoretically acids are neutralized by alkalis and alkalis by acids. This is all right in glass beakers in a laboratory. It has no place in first aid for the eye, as the treatment might be worse than the condition itself.

Cone Mills Program

Improved worker efficiency, reduction of accident hazards, and higher employee morale have resulted from the vision program begun by Cone Mills, Greensboro, North Carolina, two years ago. It is reported that employees now have greater confidence in their work, and their activities during off-hours are more enjoyable.

Visual difficulties caused by trouble elsewhere in the body have been discovered and these conditions have been treated as a result of the eye program. Some employees have been transferred to other departments where they perform tasks better suited to their particular visual skills.

THE ITINERANT TEACHER PLAN for the education of partially seeing children in Illinois

DOROTHY BRYAN

Assistant Director of Education of
Exceptional Children, Blind and Partially Seeing
Illinois State Department of Public Instruction

This "contact plan" takes to the child the help he needs. Enrolled in his regular grade in the school nearest his home, he benefits from the help of the classroom teacher and the itinerant teacher who cooperate in meeting his special needs.

SINCE partially seeing children are basically "seeing" persons, they should be educated and prepared for life in a seeing society. This is best accomplished when the child can be kept in public school and in contact with the usual problems of living.

The educational needs of these children can be met in a variety of ways. The problems peculiar to the locality as well as to the individual child should be considered in the choice of program.

In the *traditional class plan* children are enrolled in a special room where the teacher arranges their program and schedules part of their work in the regular grades. In the *regular class plan* children are enrolled in the regular classroom and, whenever the teacher decides that they need additional help, they use a special resource center supervised by a trained teacher. Details for the establishment of such class plans may be found in the State Circular "Children With Visual Problems."*

* Circular Series "D," No. 12, revised 1952: "Children With Visual Problems"; Superintendent of Public Instruction, Springfield, Illinois.

The *itinerant teacher* or *contact plan* which will be described here takes the special help a partially seeing child needs to him rather than taking him to the service. The child is enrolled in his regular grade in the school nearest to his home. He benefits from the cooperative effort of the classroom teacher and itinerant teacher working and planning together to meet his needs. In and out of school he associates with the children from his own neighborhood. Emphasis is not placed on his differences and, as a result, he has an opportunity to develop naturally and to become a well adjusted, active and participating member of his community.

This plan which has proved quite successful in some urban districts may, if properly established and administered, meet the needs in rural areas, since there are seldom enough partially seeing children in a small community to justify the establishment of a special class or resource room; and daily transportation of children for such a program would not usually be feasible owing to the great distances involved.

Responsibility for Service

The contact plan is a cooperative one under which several school districts may work together. It is necessary for each district to recognize certain essential responsibilities. Employing an itinerant teacher should be the responsibility of one district even though the service will be spread into several others. This administrative or base district works out a plan to receive from other districts their share of the expense of tuition, and of other items essential to a unified plan. The cooperation of all agencies and individuals interested in the welfare of children is needed in planning for them; for example, the county superintendent of schools, public health nurses and representatives of the various local agencies and service clubs will be working with the local schools.

Financial Arrangements

To be eligible for state reimbursement a school district must meet the standards of an approved program. This includes the provisions that the special teacher meet the minimum qualifications for certification. In the itinerant teacher plan the state reimburses for the salary of the special teacher to the same amount that a teacher with equal training and experience would receive on the regular salary schedule for teachers in the district. The district files a copy of its salary schedule with its annual claim for reimbursement. If it does not have an official salary schedule, it submits a copy of its payroll. No differential in salary to the special teacher is included in the claim. A district desiring to pay a salary differential assumes full responsibility for it.

The cooperating districts work out a plan for prorating both the cost of supplies and equipment needed to carry on the program and the travel expenses of the teacher.

Qualifications of the Teacher

The same qualifications are needed for an itinerant teacher as for the one working in a special class plan. In addition to her professional training there are certain essential personal qualities to be considered. She should have maturity, tact and poise. She needs a background of varied experiences and teaching in regular grades. In most cases she will need an orientation to the secondary school program, as well as the elementary one. Her general and mental health must be good and it is very important that she have good vision.

Locating the Children

Before a program can be established it is necessary to make a survey to discover all the partially seeing children in the area who should receive service. Each child should meet the standards of eligibility set by the state. Psychological examination will be necessary where there is doubt that any child meets the "sound mind" clause in the law.

A spot map indicating location of the children will be needed to determine the number an itinerant teacher can serve and to work out her schedule.

Office and Storage Space

The administrative school district provides centrally located office space for the itinerant teacher and necessary equipment such as desk, file cabinet, large-type typewriter, office supplies, etc., as well as a telephone or accessi-

bility to one. In conjunction with this there must be adequate storage space for supplies and equipment such as large-type dictionary and textbooks, magnifying devices, large-type typewriters, easels, maps, etc.

In each school building she must be provided with work space: for example, a small room that is used on other days by the school nurse, speech correctionist or visiting social counselor. Such space should be lighted adequately and afford privacy for working with the children or conferring with school personnel, parents and others.

Determining the Case Load

The case load will depend upon a number of factors. Geographical distribution will determine the amount of travel involved. Cause distribution, visual acuity level, near acuity, type size feasible for each child and the organization plan of the various schools will all need to be considered. The Division of Special Education of the Department of Public Instruction should be consulted to determine the case load on an individual basis. During the initial period of adjustment it is usually desirable for the teacher to visit each child at least once a week. Some children may need to be visited two or three times a week. After this period some may get along very well when visited only once or twice a month. Where there is more than one child in a school there will be times when arrangements can be made for group work. In most situations a teacher can work satisfactorily and individually with as many as 30 children.

Ocular records must be completed before a child is eligible for this service and they should be in the hands of the special teacher if she is to know how to plan her work. It is her responsibility to see that the child is re-examined at the proper time; that he learns how to take the proper care of his glasses if he uses glasses; that he learns proper eye hygiene and how to use his vision to the best advantage without harming it. She will call upon the oculist to plan with him in the best interest of the child and to interpret the school program to him. She will work with the school nurse and the family as well as the child in regard to these functions.

Work Schedules

To eliminate waste in time and mileage the spot map should be used in planning the schedule of regular visits to the various schools. Most junior and senior high school programs are departmentalized and the special teacher will want to visit children in these schools during their free periods or regular study periods instead of at a time scheduled for a subject matter class. Therefore she should plan this part of her schedule first, then fit the work with the elementary school children into the time that is left. It is desirable to maintain as fixed a schedule as possible, keeping it sufficiently flexible to allow for changes within the school's program and extra time needed for special work with an individual child. Her schedule should be made available to the main office of the administrative district and to each school in which she works so that she may be located easily if need arises. When a change in plans occurs, she should notify the main office and the next school she is to visit. Upon arrival at a school she should first check in at the office of the principal and also check out before leaving so that she may be located easily at all times.

Prior to beginning the year's work all the classroom teachers should be oriented to the program and the role of the special teacher. They should feel free to call upon her for help in obtaining good visual environment in their rooms, for explanation of the eye condition of any child even though he may not be classified as partially seeing, and for consultant service for the child with multiple handicaps. They should know enough of her work to have consideration for her time schedule and still use her help.

The special teacher should arrange her work so that she is available to classroom teachers or others for a conference period at set times each week. Certain periods should be scheduled after the close of the school day to provide for the teachers coming from a distance. It will prove more satisfactory in most programs of this type to hold such conference periods in the office of the special teacher since it will be centrally located.

Time allowance should be made for the special teacher to work with the school nurse, the psychologist, and the school librarian. The latter will help to choose supplementary books in type of 12 point or larger, and will make up a card catalogue of these according to subject, author and title, with the approximate grade level of each noted. Also, a subject index file should be compiled, giving the major topical classifications in each book so that information on a given subject can be obtained more easily.

Before beginning actual work with children, time should be spent with each classroom teacher who has a partially seeing child in her group. She will need to know what she can do and how the special teacher can help her. The special teacher will need to visit the regular class at first to observe the child in his classroom setting, to see how he fits into the group, to determine the reaction of the other children to him, to note the special equipment he will need and the manner in which the teacher carries on her program. With this information the special teacher can help the classroom teacher in seating the child properly, in scheduling his work so that eye rest periods alternate with those of eye use, and in planning areas of work in which he must have restricted participation, such as limited physical activity for the child with high myopia. By establishing a cooperative working relationship with the classroom teacher she will receive full information about the child's progress, and will know the areas in which he needs her special help.

At least a week in advance all material which a particular child will need in large type or large form should be turned over to the special teacher so that she can obtain or prepare it for him. This is her responsibility and it may necessitate a vast amount of library research, transcribing by hand, by typewriter with large type, or duplicating machine. She also obtains suitable magnification devices for those children who can profit from their use. At the junior and senior high school level she arranges for student readers when needed.

The special teacher should spend some time teaching typing to the older children who will have the most use for it. In the initial stages of this her supervision will be needed more often than at a later date. Provision of typing and study space is important. This may be in the same room where

the child works with the special teacher or elsewhere under quiet conditions.

Subjects taught by the special teacher vary from time to time but should be based on the existing needs of the child as determined in conference with his classroom teacher.

Equipment and Supplies

The special teacher should build up a repository of materials in the designated storage space, keep a complete inventory and approve all requisitions for special supplies and equipment. In planning, it should be remembered that under the itinerant teacher program there may not be need for all the equipment used in a class plan.

Records and Reports

The classroom teacher keeps the same records for the partially seeing child as she does for all others. The special teacher is responsible for all records relative to the division of special education. These include, as previously stated, the ocular records, a case study with a running report, samples of the child's work to show progress, etc. The special teacher should be sure to make known to the classroom teacher the pertinent facts in these records and should give her duplicates of any which will be of help in working with the child.

The special teacher turns in to the superintendent of schools and to each principal a monthly schedule and a summary of her work, and a final report at the end of the year. Copies of these are filed in her own office to be reviewed by the Division of Special Education along with the case records of all children receiving service.

Counseling and Vocational Planning

Program planning for the child going from elementary to high school, and counseling on the personal problems related to his handicap are the responsibility of the special teacher. This help is needed especially by older children who are more sensitive to feelings of difference about their eye conditions. Vocational counseling should be carried on with the aid of the people trained in that field.

Home-School Cooperation

The special teacher may wish to visit the home to interpret the need for eye care and to assist the parents in establishing a desirable home study situation for the child. She should confer with the school nurse and the regular teacher about the home situation beforehand so that there is a complete understanding on the part of each as to the purpose of the visits.

Community Responsibility

Since the special teacher acts as a visual consultant for the schools and since there is always need for interesting and educating the general public to the needs of exceptional children, she may be called upon to work with community agencies and organizations. This may entail evening meetings, giving talks, preparing articles for publication, and working with the newspapers and radio.

Annual NSPB Conference

March 10–12, 1954

Hotel Jefferson

St. Louis, Mo.

Standards for Referral of School Children for an Eye Examination

A preliminary report on recommendations of committees appointed by the New England Ophthalmological Society and the Massachusetts Medical Society Section of Ophthalmology and Otolaryngology to study the school vision test problem.

COMMITTEES were appointed by the New England Ophthalmological Society and the Massachusetts Medical Society Section of Ophthalmology and Otolaryngology to conduct a joint study of the school vision test problem. The cooperation of the Harvard School of Public Health and the Children's Medical Center was obtained. By use of a questionnaire information regarding standards which physicians use in their own offices and standards which they advocate that others use for referral has been obtained and analyzed. Questions regarding their choice of functions to be tested, who should administer the test and who should refer the pupil were included. A complete report of this survey is now prepared for publication. The following represents the first recommendations of the joint committee and has been presented and approved by the New England Ophthalmological Society and the Section of Ophthalmology and Otolaryngology of the Massachusetts Medical Society.

Administration of Test

The committee, after consideration of the findings of the questionnaire and by discussion among themselves of the various problems involved, mutually agreed to the following:

A school vision test should be given by a lay person who has been specially trained; this may be a teacher, a nurse or any other of the school personnel.

It is desirable that every child failing the school vision test be given a re-examination before a note is sent home to the parents. This retest may be given by the same individual who gave the first test or preferably by the school nurse or some other such person who has been specially trained.

The test should be given annually.

The committee does not feel that it is a good policy for an eye doctor to give the test for the following reason: A doctor making the test and giving a passing report might give a false sense of security to the individual that all is well. Since this screening test is at best only a rough, incomplete examination there is no basis for such an inference. If the test is given by a lay person this danger can be avoided.

The eye doctor should be utilized in a school vision program only in an advisory capacity.

The committee feels that no note telling that a child has passed a test should be sent home. Reports should be only of non-passing and should not give information other than that.

Functions to be Tested

The committee has decided that there must be a test for visual acuity. All children up to but not including the fourth grade should be referred for examination in the event that they are unable to read the 20/40 line with the worse eye. Children from the fourth grade level and including the fourth grade and up should be referred if they are unable to read the 20/30 line. It is felt that this limit is not too strict in view of the fact that the committee recommends well-illuminated charts and that the test be given by trained personnel.

Secondly, the committee advises that a test for hypermetropia be included. In those children up to but not including the fourth grade +2.25 sphere is used as the minimal limit for hypermetropia requiring referral. That is, if a child can read 20/20 through a +2.25 sphere with either eye he should be referred for further examination. In the group from the fourth grade level and above a +1.75 sphere and the ability to read 20/20 through this lens is advised.

Thirdly, the committee recommends in spite of the fact that the questionnaire revealed equivocal responses as to the place of the heterophoria test that such a test be included in the school examination, but that it need not be done on the children of the group up to the fourth grade. The criteria for passing shall be those limits set: *Distance:* 4△ exophoria: 6△ esophoria and over 1¼△ hyperphoria. *Near:* 8△ exophoria: 6△. Esophoria and vertical phoria need not be tested at near.

It is felt that to omit a test for heterophoria would be the same as stating that heterophoria is not capable of producing symptoms and since nearly 50 per cent of those questioned felt the need for such a test the committee agrees that the test should be continued at least for the time being.

Referral for Eye Examination

In the larger aspects of the school vision program the committee feels that every child who seems to have eye symptoms should be given the benefit of an eye examination. Any child who obviously appears to have any eye difficulty should be referred for an eye examination. Any child who has reading disability should be referred for an eye examination, regardless of how he behaves with the school vision test.

The committee would also like to report that no test on the market should be considered as the best ultimate test, and that all these tests should be reviewed periodically.

The committee would like to continue in existence and report from time to time on progress in this field.

Insofar as the testing devices now on the market are concerned the committee feels that the Massachusetts Vision Test is at the present time acceptable, because it does include tests for visual acuity, hypermetropia and heterophoria. The committee feels that the tests for stereopsis, color vision and other binocular functions, while of great value, are not desirable to include in a school vision test at this time because they take more time; add to the complexity of understanding the test when given by lay people; and lead to a larger number of referrals than necessary.

The committee expresses the hope that testing will err in the direction of

over-referrals rather than under-referrals; that the doctors to whom referred patients go will appreciate the fact that the tests are not absolutely accurate; and that when a child is referred who requires no treatment the doctor will explain to the parents the desirability of the examination rather than give the impression that both child and parents were exposed to needless inconvenience.

Committee for the New England Ophthalmological Society

Walter B. Lancaster,* *Chairman*
Edwin B. Dunphy
Brendan D. Leahey
James J. Regan
Albert E. Sloane
Elton R. Yasuna

Committee for the Massachusetts Medical Society

Walter B. Lancaster,* *Chairman*
Edwin B. Dunphy
Brendan D. Leahey
James J. Regan
Albert E. Sloane
Elton R. Yasuna

Committee for the Harvard School of Public Health and the Children's Medical Center

Harold C. Stuart
J. Roswell Gallagher
William Schmidt

* Deceased.

Minnesota POB Activities

More than 40,000 Minnesota school children have now been screened for visual defects under a special program conducted by the Minnesota Society for the Prevention of Blindness, according to a recent issue of *Minnesota's Health*. About one in five of the children, it is stated, has been found to need some form of treatment. The society provides the services of an ophthalmologist who examines the children's eyes in local diagnostic clinics set up with the approval of county medical societies. Funds to provide glasses or treatment for hardship cases are given or lent by local service clubs. The clinic service is limited to counties where there is nursing service that meets state requirements.

Special Teacher Training

A plan to prepare all teachers to give special instruction to the handicapped was under discussion at a workshop held recently at N. Y. U. Bellevue Medical Center and attended by representatives of 11 state teachers' colleges. Instructional units in the education of children with physical and mental handicaps will make every teacher a "special teacher."

The proposed program, which is supported by state university officials, has a two-pronged objective: to train the classroom teacher to deal with children in regular classes who suffer from moderate handicaps; and to further the present trend of educating the handicapped, at least part time, in the regular classroom.

"Some are losing sight of the old axiom that any sound program can be only as good as the personnel who operate it. Any plan or organization of professional services, whether developed from within the professions or imposed upon them from without, which lessens the responsibility of the trained professional worker or denies him the rewards of superior ability and character will, in the long run, be detrimental to the public welfare. Hence, the conditions of employment as well as the recruitment and proper training of professional personnel are essential to the maintenance of high standards of medical and health services."

WILLARD C. RAPPLEYE, *Dean*
Faculty of Medicine, Columbia University, at 1952 Annual Conference of New York Tuberculosis and Health Association.

GROWTH OF EYE RESEARCH

FRANKLIN M. FOOTE, M.D.

WHEN the National Society's committee on research was reorganized in 1949, one of its first activities was to survey funds available for eye research. Seventy-two medical schools were queried, as well as eye hospitals and laboratories. From the medical schools alone, 65 replies were received. It was found that $905,000 was expended for eye research in that year, or approximately $3 per blind person.

A similar survey for 1952, based on replies from 68 medical schools, eye hospitals and laboratories and from the Armed Forces, showed a total of $1,579,000 available, an increase of 75 per cent or approximately $5 per blind person—based on Hurlin's estimate of 308,419 blind as of July 1, 1952.

In 1949 there was not a single eye research center with a budget of $100,000 or more. In 1952 one institution had a research budget of $121,000 and two others each exceeded $200,000. The latter two were largely supported by private funds.

A great stimulus has been the increase since 1950 of grants-in-aid available through the Public Health Service Institute on Neurological Diseases and Blindness of the National Institutes of Health. In the fiscal year 1952–53 that institute made total

TABLE I

Funds Expended for Eye Research—1949 and 1952

Census Divisions	1949	1952	Per cent change
New England	$74,800	$216,277	189
Mid-Atlantic	162,886	270,942	66
South Atlantic	89,502	127,900	43
North Central	109,629	362,519	231
South Central	400	133,096	high
Mountain and Pacific	66,426	96,562	45
Federal and national agency research	400,922	371,580	−7
	$904,565	$1,578,876	75

TABLE II

Funds for Research per 1,000 Population

Census Divisions	1952 Research Funds	1952 Census Estimates	Dollars per 1,000 Population
New England	$216,277	9,509,000	$22.74
Mid-Atlantic	270,942	30,949,000	87.54
South Atlantic	127,900	22,073,000	57.94
North Central	362,519	45,802,000	79.15
South Central	133,096	26,543,000	50.14
Mountain and Pacific	96,562	20,890,000	4.62
	$1,207,296	155,766,000	$77.51

grants of about $250,000 for research in eye disease; in 1953–54 about $400,000 is available for such grants out of a total budget for the Institute of $4,500,000.

The National Society has had smaller funds for research, but it is hoped that these have been a stimulus as well as of assistance in a number of centers. Total National Society grants allocated in 1952 amounted to $30,000.

Some medical centers were better prepared than others to utilize effectively funds which became available, or were more successful in obtaining funds. The accompanying tables show the funds available in 1949, compared with 1952; and funds available in 1952 compared with population of major census divisions.

METAL TRADES STUDY

An industrial sight conservation survey of metal trades industries in the Detroit metropolitan area has been conducted by the University of Michigan. Two University agencies, the Institute of Industrial Health and the University Eye Department collaborated on the program, with active cooperation given by state and city health departments. A wide range of metal fabricating and processing plants were included.

The fact-finding study covered eye examinations, correction and placement, eye medical care, eye hazards, safety and safety education. It was concerned primarily with plants of 150 to 750 employees. The industrial vision program appraisal form of the National Society for the Prevention of Blindness was used as a basis for "on the spot" inspection and evaluation.

The field study was carried out by Dr. Ralph W. Ryan, an ophthalmologist associated with the two University departments. Results of the study are to be published with suitable analysis and interpretation.

MRS. McINTIRE HONORED

Mrs. Hazel C. McIntire, for 30 years director of the Ohio Department of Special Education, has been accorded honorary life membership in the National Society for the Prevention of Blindness. This honor was announced by Mason H. Bigelow, president, at an October 6th luncheon meeting of the Society's Advisory Committee on Education of Partially Seeing Children, of which Mrs. McIntire is chairman.

On this occasion Mrs. Winifred Hathaway, former NSPB associate director, paid a delightful tribute to the Ohio educator whose work is directly benefiting some 60,000 partially seeing children. Mrs. McIntire's influence, she said, reaches far beyond the boundaries of her state. In fact, a total of 32 states have followed the Ohio pattern of special education.

Mrs. McIntire is a past president of the National Association of Directors and Supervisors of Special Education and has served on many national and local committees dealing with the problems of partially seeing children. She was recently elected to membership in the Alpha Delta State Chapter of Delta Kappa Gamma—an honorary society for women who have made outstanding contributions in education. In 1948 she was awarded the honorary degree of Doctor of Pedagogy by Bowling Green State College, Ohio.

NSPB at Work

IN the NSPB mailbag on a recent morning were requests for material of various types from 28 states, Canada and South Africa. Records for more extended periods of time show the geographic range of such communications to be the continental United States, its territorial possessions and countries all over the globe. During the period of a year some 14,000 communications relating to NSPB pamphlets, manuals, posters, vision-testing charts and periodicals reach the desk of Regina Schneider, secretary of the Society, who handles this large volume of correspondence in the publications department.

This figure does not include correspondence of the specialized departments which furnish information and advice in conjunction with the publications in their respective fields. Overall correspondence about eye and prevention problems amounts to about 27,000 mailings for a 12-month period.

Among the groups seeking the Society's published materials are state and local prevention of blindness organizations; volunteer and official agencies concerned with the eye field, such as departments of health, education and welfare; centers for the preparation of teachers, nurses, social workers, doctors, optometrists and public health workers; members of these professions already in service; hospitals; industrial plants; general and special libraries; writers and publishers; individuals preparing doctoral dissertations, and the general public.

About 150 different publications are in current use. They are designed for various professional groups, for the industrial field and for laymen. The subjects relate to program development; education of partially seeing children and other aspects of the school's responsibility for eye health and protection; statistics; illumination; vision screening; eye diseases and defects. There is a wide demand for the posters, and the vision-testing charts drawn to the Snellen scale.

CAMPAIGN RESPONSE

Thanks to increasing participation by all media of mass communication and full cooperation by prevention of blindness agencies throughout the country, NSPB was able to reach more people than ever before with its eye care information during September, "Sight-Saving Month."

Edward R. Fay, Jr., director of information service, reports that radio stations in all 48 states and TV outlets in at least 30 carried messages inviting listeners and viewers troubled about danger signals to write for a free NSPB folder, "Eye Facts." The heavy response necessitated a doubling of the folder's print order. Newspapers and magazines, including several of top circulation, took part in the campaign. Bus companies in 54 major cities displayed the National Society's 1953 "car card" to persons making approximately 250,000,000 rides during the month.

Many prevention of blindness agencies modified NSPB campaign materials to their own uses; some even organized state campaigns of their own. State committees of NSPB conducted

widespread educational activities. Major help was given by the national Advertising Council, whose approval paved the way for impressive radio and TV participation, and by governors of 27 states who officially designated September as "Sight-Saving Month," also by business organizations and public and private agencies.

The value of this cooperation was measured not only in terms of the unprecedented response, but in the satisfaction described by Mason H. Bigelow, NSPB president, in a letter to one of the 27 governors:

> "Here at the Society we believe we are doing important work, and it is always encouraging to have men in responsible positions agree with us to the extent of according our program practical help."

FIELD ACTIVITIES OF EXECUTIVE DIRECTOR

In recent months Dr. Franklin M. Foote, executive director, has spent considerable time in the field in consultation with various agencies and individuals, addressing meetings, and attending conferences. The latter included the Kentucky State Medical Society Eye, Ear, Nose and Throat Section, at Louisville; the American Medical Association Conference on Physicians and Schools at Highland Park, Illinois; the International Council for Exceptional Children at Memphis; and the New Jersey Association of School Nurse Supervisors at Trenton.

Early in October Dr. Foote appeared at a hearing of the House Committee on Interstate and Foreign Commerce in Washington and presented facts in support of the need for increased appropriations for eye research.

During a busy week at the annual meeting of the American Academy of Ophthalmology and Otolaryngology in Chicago Dr. Foote participated in a conference of representatives of organizations interested in blindness research, this group to be known as the National Committee for Research in Eye Diseases and Disabilities. He also attended meetings of the National Interprofessional Committee on Eye Care; Joint Committee on the Cooperative Retrolental Fibroplasia Study; Pan American Association of Ophthalmology; and the NSPB Committee on Glaucoma. In addition to many individual conferences Dr. Foote attended AAOO sessions and instruction courses.

A similar schedule was followed at the American Public Health Association meeting in New York, where an NSPB exhibit on blindness in preschool children was on view.

A paper on "An Evaluation of Vision Screening" by Marian M. Crane, M.D. and Dr. Foote will appear in the January 1954 issue of *Exceptional Children*.

STATE COMMITTEES

Seven NSPB state committees have been organized by the field service consultant, Mrs. Ruby M. Hopkins. These are California, Colorado, Connecticut, Georgia, Indiana, Michigan and Missouri.

Under the leadership of Jack White, chairman, Mrs. Harry S. Gradle and

Mrs. Frederick J. Hellman, vice chairmen, the California committee is endeavoring to raise sufficient money in the Harry S. Gradle Memorial Fund to enable them to establish a permanent office and become a chapter of the National Society.

The preschool vision testing project in Denver is demonstrating to the community the way in which trained volunteers can meet the need to further the program of prevention of blindness. The state committee chairman, Mrs. Austen G. Brown, was formerly project chairman for the Denver Alumnae Chapter of the Delta Gamma Fraternity and with her committee members worked hard to bring about the participation of this group in the vision testing project. To date 50 volunteers have been trained; they will test the vision of approximately 2,500 preschool age children this winter.

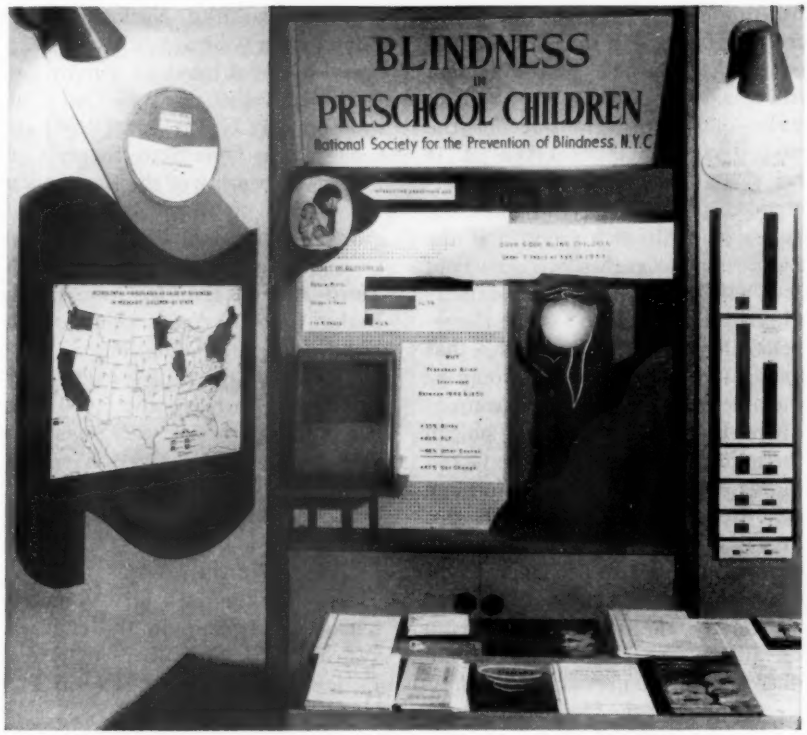
The Connecticut committee which was organized in the spring of 1953 undertook as its first project the sponsorship of a fireworks bill for the state. The state chairman, Stanley F. Withe, presented the bill to the state legislature. It was passed when the lieutenant governor cast his vote to the tied vote in the Senate. At a recent meeting the three district governors of the Lions Clubs were added to the state committee; and a special subcommittee was formed to work with the Lions in their promotion of research in the field of prevention of blindness. Dr. Eugene M. Blake, chairman of the professional advisory committee, and Dr. Ira V. Hiscock of the Yale School of Public Health serve on this committee.

The Georgia committee of NSPB under the leadership of Alvin B. Cates sponsored the National Society's exhibit "Progress and Problems in Prevention of Blindness" at the Southern Medical Association meeting held in Atlanta October 26–29. This committee has been active in increasing the statewide membership and promoting the showing of the glaucoma film "Hold Back the Night."

In Fort Wayne, Indiana, there has been an enthusiastic response by the local department of education and the Fort Wayne Junior League to the need of a vision-testing program for kindergarten-age children. Jane McBride, vice chairman of the Indiana committee in charge of program, was responsible for this local interest. Through the leadership of Mrs. Eugene C. Pulliam, state committee chairman, funds have been made available for the promotion and purchasing of educational materials. Films and publications are being distributed throughout the state.

The Michigan committee holds quarterly executive meetings at the Kresge Eye Institute in Detroit. Programs in prevention of blindness are reported by the Detroit Society for the Prevention of Blindness and the Grand Rapids Association for the Blind. Edgar A. Guest serves as chairman of the state committee, Mrs. Russell S. Strickland as vice chairman and Elliott S. Nichols as secretary.

The Missouri committee is planning meetings this fall with public health, school and industrial nurses to coordinate the program of sight conservation throughout the state. Dr. Theodore E. Sanders has recently been appointed to serve as chairman of the professional advisory committee. Mrs. H. Rommel Hildreth serves as chairman of the state committee and Rey Eilers as vice chairman. Mr. Eilers as chair-



An exhibit at the recent meeting of the American Public Health Association in New York

man of a study committee has been meeting with the various agencies in St. Louis who are working in the field of blindness and prevention of blindness. The Missouri committee will serve as host to the National Society's Annual Conference which will be held in St. Louis, March 10–12, 1954.

SERVICE OF NURSE CONSULTANT

The type of service rendered by the Society's nurse consultant may be illustrated in a brief account of a field trip extending over a period of five weeks this fall. Mrs. Burnetta Blatt first visited Denver, Colorado, and there trained a group of Delta Gamma volunteers to do vision screening. These volunteers are to work under the supervision of the local school nurse in the nursery schools associated with the adult education project of the Denver Public School system.

Mrs. Blatt then traveled 1,200 miles by car through Idaho with Miss Elaine Goben, the state's generalized nursing consultant, holding three one-day institutes for school, public health and industrial nurses in Pocatello, Coeur d'Alene and Boise.

During an eight-day period a group of Junior League volunteers were trained and supervised in the vision screening of kindergarten children in Fort Wayne, Indiana, at the request of A. T. Lindley, school superintend-

ent. Although NSPB urges that vision screening be done in the regular classroom by the teacher in conjunction with teacher observation, to date there has been no provision for screening the younger children in Fort Wayne. It was therefore agreed by the superintendent of schools, the teachers, the professional advisory group and the volunteers that such a project would serve as a demonstration, eventually helping the teachers to assume the responsibility, with the knowledge that if assistance were desired it would be available from the volunteer group.

Mrs. Blatt next went to Michigan where, in cooperation with the Grand Rapids Association for the Blind and Sight Conservation, she conducted a three-day institute for industrial, school and public health nurses. One session was devoted to lay groups and particularly the P.T.A. and health education committee chairmen; another to practical nursing students. As guest speaker at the Lions Club luncheon Mrs. Blatt told the members present how they, as heads of families, representatives of industrial organizations and workers could best aid in conservation of sight.

Included in this five-week tour were eight radio and two television interviews. The importance of complete eye examinations for children before entering school and periodic examinations for people over age forty was stressed on these programs.

INDUSTRIAL PROGRAM

In connection with the Society's program of service to industry, James E. O'Neil, its director, visits various plants to consult on vision problems and attends national and regional meetings and conferences. On his fall schedule was the National Safety Congress in Chicago where he addressed several hundred delegates on the objectives of the Wise Owl Club, sponsored by NSPB. Mr. O'Neil also spoke at the Ohio State Safety Conference, a meeting of the Connecticut Association of Industrial Nurses, a group conference of Reynolds Metals Company safety personnel, and the Third Annual Eye Institute of the Berks County Association for the Blind, Inc., in Reading, Pa.

The Wise Owl Club's membership is expected to reach the 5,000 mark before the end of the year. Seven hundred ninety-three chapters have been organized to date in plants with a total employee enrollment of 1,084,625. All the states, Hawaii and Canada are represented in the roster.

New York State's first vocational school membership in the club was awarded in November to Henry Puciato, a student at Hastings-on-Hudson High School.

An exhibit of Wise Owl materials was maintained at the CIO convention in Cleveland with Mr. O'Neil in attendance.

SARAH A. BUTTS JOINS STAFF

Sarah A. Butts, who joined the NSPB staff in September as medical social work consultant, has a broad background in the field of social service. She received her Master's degree from the School of Social Service Administration, University of Chicago, and in June 1953, a third year certificate with a specialty in medical social work from the School of Social Work, University of Pittsburgh.

Miss Butts has had experience in social agencies in St. Louis, Cleveland and elsewhere. During World War II

she served in New Zealand as assistant field director with the American Red Cross at a United States Naval Hospital, later working with Red Cross Home Service chapters in New York City. More recently she has been employed by the Veterans Administration as case supervisor, and subsequently chief social worker at the VA general medical and surgical hospital located in the Bronx.

Health Council Appointment

Mason H. Bigelow, president of the National Society for the Prevention of Blindness, has accepted membership on the National Health Council's executive committee. This body, established in 1921, is composed of 40 national agencies.

North Carolina Eye Bank

The Eye Bank for Restoring Sight, Inc., of North Carolina, chartered by the state in 1951 to secure and supply eyes to all North Carolina hospitals and physicians, is an affiliate of the Eye Bank for Sight Restoration, Inc., of New York. There are about ten ophthalmologists who perform corneal transplants in North Carolina.

Dr. Sam McPherson, Jr., Dr. E. W. J. Larkin, and Dr. W. K. Newton are members of an advisory committee of the North Carolina Medical Society, assisting with the bank's medical problems. In each town in North Carolina that has an airport there is a regional medical director who aids in disseminating knowledge about the Eye Bank. Eyes are carried free of charge by Piedmont Airlines, Eastern Airlines, Capital Airlines, and by private taxi and limousine services in the state.

Read with a clear, good light falling from above over your shoulder.

Hold your book about fourteen inches from your eyes.

Always read with your head up.

Keep your books clean; a soiled page is hard to read.

Avoid books with glossy paper, small type, or poor printing.

Rest your eyes frequently.

If your eyes ache, or if you have trouble in seeing things distinctly, tell your mother or your teacher.

BOOK MARK OF

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This "Book Mark for Juniors" is available from NSPB; price $1.00 per 100; $7.50 per 1,000.

AROUND THE WORLD

BRAZIL

Manoel A. da Silva Foundation—A photograph of Dr. Manoel A. da Silva was hung recently in the room of the São Paulo Ophthalmological Study Center library which bears his name. During this ceremony, Dr. Renato de Toledo, chief of staff of the department of ophthalmology of the Escola Paulista de Medicina, and Dr. Jair X. Guimaraes cited Dr. da Silva's record up to the time of his death in 1950 at the age of 36.

The Manoel A. da Silva Foundation will be well endowed in the future, since Dr. da Silva's parents have willed their entire estate for its establishment. The foundation is dedicated to the advancement of the teaching of ophthalmology and will carry out its work through the Ophthalmologic Study Center and the department of ophthalmology of the Escola Paulista de Medicina.

ENGLAND

Diabetes Increasing—Dr. Leonard H. Howells, speaking before the section of ophthalmology at the British Medical Association's 1953 annual meeting, stated that the diabetic population of Great Britain is increasing. Since there is an undoubted hereditary transmission of the disease, he said, the increased fertility and safer childbirth lead to greater numbers of surviving diabetic patients. With the increased longevity of diabetic patients, ocular complications become more common, some 30 per cent of all diabetics eventually developing retinopathy. In many older patients hypertensive and renal involvement accompany the ocular complications. Dr. Howells found that the incidence of retinopathy varied little according to the duration of the disease, and that it occurred at least as frequently in well controlled as in partially controlled diabetes.

Mr. G. I. Scott, who spoke at the same session, emphasized that diabetic retinopathy occurs as an entity quite distinct from that resulting from hypertension and atherosclerosis. Among 150 diabetics, retinopathy was equally common in patients with or without hypertension. Although ten per cent showed retinopathy within a year after the diagnosis of diabetes the incidence of retinopathy increased with duration of the disease. Retinitis proliferans developed in nine to 16 per cent of all cases of retinopathy. Refraction changes and diabetic cataract were also noted.

Mr. A. B. Nutt stated that delayed wound healing, infection, hemorrhage, and postoperative iridocyclitis occur as complications in diabetic patients undergoing cataract operation.

Corneal Grafting—At a recent meeting of the Medical Society of London, a discussion was held on "The Present Status and Future Prospects of Homologous Tissue Transplantation." Mr. B. W. Rycroft, in his talk on corneal grafting, said that although the idea

is old, visual results had been disappointingly poor up to the beginning of this century. The poor results were due to infection and to attempts at grafting of tissue from a different species. Criteria of success vary; some judge by the clarity of a graft, others by visual improvement.

Among Mr. Rycroft's patients about 60 per cent had visual improvement after split corneal graft and about 30 to 40 per cent improved after full thickness graft. Vascularization and edema of the graft are two primary causes of failure of corneal transplantation. Vascularization may be controlled by local beta radiation and by cortisone. Edema remains a problem. Eyes of aged persons who died a natural death are considered by Mr. Rycroft as most suitable.

London Eye Sanatorium—The results of the first year of operation of the Swanley Eye Sanatorium, devoted to the treatment of ocular tuberculosis in Great Britain, were reported by Drs. D. P. Choyce and A. G. Cross recently in the *British Journal of Ophthalmology*. At the Sanatorium, opened in June, 1951, by the Minister of Health, Mr. H. Marquand, 47 patients were treated and discharged during the year. Treatment there is of value in all cases of ocular tuberculosis and of some help in non-specific cases of uveitis and periphlebitis retinae. Occupational therapy is a necessary part of the regimen.

Midget Magnet—British doctors and engineers have developed a powerful midget electromagnet for removing metallic particles from the eye. The thirteen-pound device, still in experimental stage, is small, portable, and more powerful than some larger magnets weighing as much as 100 pounds. It can be used by the private physician, in hospitals, and in factory first-aid rooms.

Eye Injuries Reduced—The 1951 Annual Report of the Chief Inspector of Factories indicates that occupational eye injuries have been substantially reduced; the figure for 1951 was 12 per cent below that for 1950.

Considerable progress is reported in the quality of lighting of factories. Interest is shown in taking advantage of natural lighting to the greatest extent possible in the design of new buildings. Fluorescent systems are responsible for extensive improvement in artificial lighting. The black, white and grey color schemes in factories still persist, but enlightened managements, believing that cheerful surroundings can produce a sense of well-being that is reflected in increased output, are making efforts to use color to the best advantage.

Boxing Hazard—A correspondent of the *British Medical Journal* who is an ophthalmic consultant to the British Board of Boxing Control, claims that "liability to retinal detachment in moderate myopia (up to −4 D.) at this age (schoolboys) is probably no greater than in non-myopes. . . ." He adds that in all cases boys should wear rubber-framed goggles.

The opinion of an expert consulted by the *Journal* is reported to be in sharp disagreement with the first statement. This authority has seen "many eyes seriously damaged or totally wrecked as a result of blows from boxing. . . ." Whatever the vulnerability of normal eyes to boxing injury, he believes, it is enhanced if the boxer is even slightly myopic.

INDIA

Madras Hospital—New wards providing accommodations for 90 additional patients were opened recently at the 130-year-old Government Ophthalmic Hospital in Egmore, Madras. The Madras hospital was built to accommodate 170 patients, but normally houses about 500; even the new wards are in buildings originally intended for other purposes.

This institution, said to be the second oldest ophthalmic hospital in the world, was the first to start an eye bank in India. An editorial in *The Antiseptic*, June 1953, praising the initiative and progress of the Madras hospital, expressed the desirability of enacting corneal grafting legislation similar to that passed by the British Parliament in 1952.

This humanitarian institution, dedicated to the care of the unfortunate by the more fortunate, works within the philosophy that "if humanity requires that we look after the blind, it imposes upon us all, government included, the still more important duty of keeping God's creatures from going blind."

PHILIPPINE ISLANDS

Report on Atom Bomb Effects—Lt. Col. Pelagro G. Pontenciano, air surgeon of the Philippine Air Force, reported recently in the *Journal of the Philippine Medical Society* on the effects of atomic explosion on the human body. He states that direct eye injuries are remarkably few. Only a few palpebral burns have been noted. Temporary amblyopia, averaging five minutes in duration, was noted in most patients, and conjunctivitis and keratitis in a few. Permanent scotoma from perforation of the macula lutea was reported in only one case. Traumatic cataract following contusion of the eyeball occurred in two patients. Corneal transparency was slightly reduced in some, but no subjective difficulties were encountered. One patient, blinded by the flash for two days, recovered completely.

The most important factor in the prognosis of atom bomb casualties is the patient's position relative to the explosion.

POLAND

Causes of Blindness—A survey by Drs. L. Rostkowski and H. Wolter of the records of 2,257 blind subjects reveals that 26.5 per cent of blindness in Poland is caused by infectious diseases; 24.7 per cent by injuries; 17.6 per cent by unknown etiologic factors (including glaucoma, 12.8 per cent, and retinitis pigmentosa); and 10.6 per cent by congenital conditions. Anatomically, optic nerve atrophy was the most frequent cause, followed by leukoma and phthysis bulbi. These figures, which the authors consider representative for Poland although they do not include all blind persons, indicate that blindness from infectious diseases has decreased since 1936, while congenital anomalies have increased.

INTERNATIONAL

Trachoma Organization—Professor Arnold Sorsby, research professor in ophthalmology at the Royal College of Surgeons and Royal Eye Hospital, London, has been elected secretary-general of the International Organization Against Trachoma. The group was founded by the Thirteenth International Congress of Ophthalmology in 1929.

CURRENT ARTICLES

Retinal Changes in the Toxemias of Pregnancy. II. Mild and Severe Hypertension, Renal Disease, and Diabetes Mellitus. Landesman, R., Douglas, R. G., and Snyder, S. S. *American Journal of Obstetrics and Gynecology*. Vol. 63. p. 16. January 1952.

Retinal changes noted in pre-eclampsia and eclampsia, where no pre-existing vascular or renal disease was present, were transient and usually reversible. The vessels were always found to be normal on examination six weeks post partum. Retinal arteriolar changes evident early in pregnancy in hypertensive or renal diseases were probably present prior to conception. A sudden or gradual elevation in blood pressure with corresponding progression of retinal arteriolar changes may occur late in the second or in the third trimester, and is usually considered to be pre-eclampsia superimposed on underlying vascular or renal disease. Blood pressure and retinal vascular alterations are closely paralleled, as in true toxemias. Careful examination of the retina prior to or early in pregnancy aids in the interpretation of later changes.

According to the severity of retinal changes, 172 patients with mild hypertension (blood pressure ranging from 140/90 to 160/100), 142 with severe hypertension (blood pressure greater than 160/100), 27 with renal disease, and 24 patients with diabetes mellitus associated with toxemia were classified into retinal grades 0 (no retinal changes), I, II, III, and IV. Retinal examination in patients with mild hypertension establishes a basis for comparison with advanced changes which may occur later. Detectable retinal vascular changes are generally absent or present to a mild degree in patients with mild hypertensive disease. No significant difference in fetal mortality was noted in the various retinal grades.

Repeated ophthalmoscopy is valuable in the clinical management of severe hypertension, as the progress of hypertensive toxemia is reflected by the behavior of the retinal arterioles. As retinal vascular disease progressed the fetal death rate increased, and among the live births there were a larger number of prematurely interrupted pregnancies. In grades III and IV the disease advanced rapidly, and in some instances reached the malignant stage, while in grades I and II the retinal changes were relatively long-standing. A large percentage of patients in group II had had repeated pregnancies. In patients with no arteriolar change the fetal prognosis is excellent, while in the presence of grade III and IV changes, interruption is necessary. Examination of the eye grounds during the first trimester in advanced hypertensive patients should play an important role in their management. Retinal arterioles re-

flect the changes of past hypertensive disease, as well as those occurring during the pregnancy. This is important in determining whether the pregnancy is adding cardiovascular injury to the mother, and as a diagnostic aid with respect to the baby. The degree of retinal change could not be correlated with edema, uric acid, or albumin, but closely paralleled blood pressure.

In renal disease, as retinal arteriolar abnormalities advance, the prognosis for fetal survival becomes considerably poorer. When advanced retinopathy is present better results are obtained by premature delivery than by waiting for further development of the fetus. In the prognosis of the diabetic patient without toxemia, retinal arteriolar examination is of little value. In diabetes associated with toxemia, on the other hand, retinal findings are of prognostic value with respect to the infant. Among the 24 patients who had diabetes mellitus associated with toxemia, 12 infants were stillborn or died during the neonatal period.

Corticotropin, Cortisone, and Hydrocortisone in Treatment of Ocular Disease. E. H. Steffenson. *The Journal of the American Medical Association.* Vol. 150. pp. 1660–1664. December 27, 1952.

The usefulness of corticotropin and cortisone in treating a variety of ocular diseases is established. It has been suggested recently that hydrocortisone may be more effective.

The patient's total physical condition should be considered in deciding whether to treat parenterally or topically, which drug to use, and the dosage. Maximal suppression of disease should be attempted with minimal amounts of hormone. Pharmacological side-effects (which are reversible on withdrawal of the drug) must be watched and counteracting measures taken to avoid serious developments.

How these agents produce favorable results in ocular lesions is not yet understood. Both corticotropin and cortisone block the antigen-antibody reaction, preventing the occurrence of allergic states; both inhibit inflammation. They afford rapid relief of pain and photophobia.

Topical administration of cortisone and hydrocortisone is relatively inexpensive, does not necessitate hospitalization, and is without systemic effects regardless of duration of treatment. Properly administered, the drugs are not harmful to ocular tissue. When limited intraocular penetration of cortisone and hydrocortisone prevents response to topical administration, parenterally administered cortisone effects rapid response. Laboratory and clinical studies are elucidating the factors determining degree of penetration. Three cases of severe iritis and one of bilateral iritis indicate that hydrocortisone is somewhat superior to cortisone. Moreover, resistance to cortisone has been known to develop, while resistance to hydrocortisone has not been encountered.

Clinical Evaluation of Cortisone in Ophthalmology. C. B. Chandler, S. D. McPherson, Jr., and F. W. Stocker. *North Carolina Medical Journal.* Vol. 13. p. 563. October 1952.

Cortisone therapy in many ocular diseases rests on an empirical basis. Its principal effect is on protein and carbohydrate metabolism, tending to produce negative nitrogen balance, relatively insulin-resistant hyperglycemia, and possibly retention of fluid

due to sodium and chloride retention. In inflammatory reactions cellular exudate and capillary permeability are reduced, and there is decreased formation of granulation tissue and scarring. The results of cortisone therapy in 143 patients suffering from various types of uveitis, keratitis, and miscellaneous other disorders are reported.

The most favorable effects of cortisone were noted in the treatment of inflammatory disorders in which no etiologic organism could be demonstrated. Since cortisone inhibits the normal defense mechanism, leaving bacteria free to spread almost at will, it is unwise to employ this hormone in instances of straightforward bacterial invasion.

The cessation of cortisone therapy was followed by a high incidence of relapse, indicating that cortisone controls the inflammatory manifestations of these diseases, but has no specific curative effect. Relapses occurred less frequently when cortisone therapy was discontinued by gradually reducing the dosage, rather than abruptly ending the medication.

The irregularity of results encountered in treating uveitis with cortisone is probably a reflection of the inability to state whether or not bacteria are present in any given case. The excellent results of cortisone therapy in postoperative uveitis represent the reactions to be expected in uveitis due to trauma rather than infection. Cortisone can effect marked improvement in acute fibrinous iritis by blocking vascular and cellular responses; the lesion is readily accessible to intensive topical therapy, and permits a high concentration of the drug in the involved tissue. Results of the treatment of various types of keratitis follow the same pattern. Episcleritis, which the authors consider an allergic manifestation of rheumatoid arthritis, gout, or focal infection, responded promptly to cortisone therapy.

The authors found cortisone valuable in maintaining the clarity of corneal grafts by decreasing corneal edema and blocking corneal vascularization.

Medical Responsibility to the Glaucoma Patient. A. E. Braley. *Journal of the Iowa State Medical Society.* Vol. XLII. p. 519. November 1952.

The statistical significance of glaucoma and its importance as a cause of blindness are discussed. The author points out the urgent need for early diagnosis and prompt treatment which in many instances will prevent loss of useful vision.

A clear, concise description of the various types of glaucoma is given, together with a detailed discussion of the value of provocative tests as an aid in making an accurate diagnosis. The author has included the principles of medical and surgical treatment, indicating that early operation may be necessary in the shallow chamber type to prevent an acute attack.

The most important factors in preventing blindness from glaucoma are summarized.

Operative Results in Juvenile Glaucoma From a Pathological Standpoint. B. F. Paine. *Ophthalmologia Ibero Americana.* Vol. XIV. No. 3. p. 281. 1952.

Juvenile glaucoma, defined as increased intraocular tension in patients ranging in age from less than one year to fifteen years, may be primary or secondary, congenital or acquired. It

causes 8.7 per cent of blindness. This report deals with juvenile glaucoma secondary to congenital defects in the aqueous drainage of the eye. There are two general types of the disease: buphthalmos, the generalized enlargement of the globe from increased intraocular pressure; and hydrophthalmos, characterized by a deep anterior chamber, wide angle of the iris, or absence of Schlemm's canal. Buphthalmos reacts unfavorably to medical and surgical procedures. Hydrophthalmos may be amenable to treatment and may respond to surgery with preservation of some useful vision.

Of approximately 3,700 enucleated eyes submitted to the laboratory of the New York Eye and Ear Infirmary between 1926 and 1949, 37 had juvenile glaucoma; 25 were of the buphthalmic type and 12 exhibited hydrophthalmos. With the exception of trabeculectomy, decompression operations of all types were attempted on these eyes; none proved successful. The efficiency of trabeculectomy and of cycloelectrolysis have not yet been evaluated.

Detection and Management of Retrolental Fibroplasia: A Plan for the Average Hospital and Staff. C. D. Benton, Jr. *Journal of the Florida Medical Association.* Vol. XL. p. 23. January 1953.

All premature infants whose birth weights are under four pounds should be given periodic ophthalmoscopic examinations beginning at the age of two weeks.

The author proposes the following plan for the average hospital and staff:

The obstetrician should make every effort to prevent premature delivery. He should attempt to minimize fetal anoxia and use supplemental oxygen only when necessary. The pediatrician should urge that the parents permit ophthalmoscopic consultation. An authorization certificate for consultation, signed by the pediatrician and designating the ophthalmologist of his choice, should be posted in the nursery. Decisions concerning treatment, discharge of the infant from the hospital, and the schedule of follow-up visits should be agreed upon by both the ophthalmologist and the pediatrician. Parents should be informed of the infant's eye condition at the discretion of the pediatrician.

Carcinoma of the Eyelids. B. Roseberg. *American Journal of Roentgenology, Radium Therapy, and Nuclear Medicine.* Vol. 69. p. 196. February 1953.

Cancer of the eyelid may develop secondary to a keratosis, which ulcerates early, or independently as a small nonulcerating lump, which usually ulcerates when it reaches a diameter of five to six millimeters. Subjective symptoms of a scratching or burning sensation, reddening of the eye, or lacrimation are not experienced until the lesion reaches eight or ten millimeters in size, and pain or discomfort are absent until the growth has spread to the palpebral margin, conjunctiva, or medial canthus, or until considerable ulceration or infection occurs. The malignant lesion may grow outward, destroying the entire free lid margin without involving the orbit, or it may involve the orbit without any extensive damage to the lid. Loss of vision or even life sometimes results.

When untreated, basal cell carcinoma of the lid runs a long chronic course of as much as 30 to 35 years.

Untreated squamous cell carcinomas metastasize more rapidly to the preauricular nodes and later to the cervical nodes.

The author employed irradiation therapy in treating 133 epitheliomas of the eyelid. Seventy-eight per cent of the patients were over 50 years of age, the average being 62.9 years. The lesions were located as follows: lower lid, 54.9 per cent; upper lid, 11.3 per cent; medial canthus, 25.6 per cent; lateral canthus, 8.2 per cent. Of these patients, 31 were not studied adequately following treatment, and are not included in the results reported.

The total number of successfully irradiated cancers of the eyelids was 86, or 84.3 per cent of the cases. These were followed up for three years or more after the last treatment to detect recurrence of the cancerous lesions. Lesions of the lateral canthus responded better to treatment than did lesions of the upper and lower lids.

Sobre las Variaciones Tensionales de los Glaucomas. (On the Variations of Tension in Glaucoma.) A. Magitot. *Archivos de Oftalmología de Buenos Aires.* Vol. XXVIII. p. 49. February 1953.

The author opposes the concept that ocular hypertension is identical with glaucoma. He believes that elevation of ocular tension is a syndrome common to many conditions, and that one may exclude glaucoma except in instances where no manifest parallel exists between the degree of hypertension and other clinical symptoms.

Dr. Magitot feels that the mechanism of ocular hypertension should not be sought in a simple anatomic obstacle localized in the angle of the anterior chamber, but in a venous hypertension which would affect not only the scleral veins but also those of the uveal tract. This mechanism is the same for primary and secondary glaucomas, and can be compared with edema of other organs.

The author cites a series of actions which localize the nervous regulator of ocular tension in the diencephalon (between the forebrain and the midbrain), and deduces that the hypertension of primary glaucoma is like the other symptoms of this ailment, attributable to a dysfunction of centers in the thalamus and pituitary.

Embriopatia Rubeolica. (Pathologic Effect of German Measles on the Embryo.) J. L. Malbran and A. L. Norbis. *Archivos de Oftalmología de Buenos Aires.* Vol. XXVIII. p. 56. February 1953.

In this preliminary paper the authors refer to their first contacts with the disease complex known as Gregg's syndrome. The principal ocular condition produced in the child by German measles during fetal life is congenital cataract, which may be central, uniform, or membranous, and is bilateral in three out of four cases. Other ocular conditions which frequently accompany cataracts due to German measles follow: microphthalmia, occurring in 66 per cent of the cases of unilateral cataract; atrophy of the iris; coloboma of the iris; nystagmus; convergent strabismus; corneal opacity.

Eight cases of congenital ocular malformations are presented. Seven of the mothers had rubella in the first to third months of pregnancy. The eighth mother had eruptions on her face and neck prior to the first month of pregnancy, but it was not identified with certainty as rubella. Four infants had

bilateral congenital cataract, and four unilateral. Of the four unilateral cases, three were accompanied by microphthalmia and one by buphthalmia. Pseudoretinitis pigmentosa was observed in two of these infants.

Evaluation of the Grether Self-Administering Color Vision Test. I. Schmidt. U. S. Air Force. Air University School of Aviation Medicine. Special Project Report. March 1953.

The Grether Self-Administering Color Vision Test (SACVT), which measures ability to match a mixture of primary colors (red, green and blue) with stimuli of white, yellow and orange, is evaluated in a special project report of the U. S. Air Force School of Aviation Medicine. The SACVT misclassifies many individuals who pass the American Optical Company pseudoisochromatic plates test (AOC). If the orange stimulus is omitted the results more nearly approach those obtained with the AOC plates. Comparison with the School of Aviation Medicine Color Threshold Tester (SAMCTT) shows that many persons who make an excellent score on the latter fail the SACVT. However, individuals with defective color vision are always detected by the SACVT. When compared with the Nagel anomaloscope, qualitative and quantitative classification of color defectives could only be approximated by the SACVT. To obtain a correct picture of color defect the test should be repeated at least three times. There is no training effect on repetition of the test. In its present form the SACVT cannot be substituted for the color vision tests currently in use. The test would be improved if the following changes were to be made: Enlarge the normal ranges; omit the orange stimulus; increase the number of tests; refine the ability of the apparatus to screen and classifiy by improving the chroma of the matches and avoiding stray light from inside and outside the apparatus; improve the balance between increasing and decreasing primary colors; allow the examinee to control his matches with neutral adapted eyes; improve the registration system.

Nouvelle Contribution a la Neuroclinique du Glaucome. (New Contribution to the Clinical Neurology of Glaucoma.) J. Sedan and S. Sedan-Bauby. *Archivos de Oftalmología de Buenos Aires.* Vol. XXVIII. p. 97. March 1953.

The authors describe hereditary glaucoma and the neuroclinical signs of glaucoma. Observations of 12 cases which have been followed for several years are presented. The good influence of physical work on the tonometric status of the glaucoma patient is believed established.

Other investigators have previously stated that muscular work reduces appreciably the number and importance of hypertensive attacks in subjects who are sensitive to miotics, and in whom muscular effort elevates humoral pressure and lowers retinal pressure. The critical point is that in subjects presenting spasms of latent glaucoma, in spite of the hypertensive crises, the visual fields and acuity were still intact. These are all workers between 43 and 57 years of age in whom clinical study was followed by a period of normal working activity with an annual period of rest for vacation or temporary inability to work.

The authors have continued to work on the clinical aspect, and see reason

to renew the studies on the action of lactic acid, histamine, and similar substances in glaucoma. Subconjunctival injections of histamine have provoked intolerable reactions, but the use of syncaine offers hope for an augmented tolerance of histamine.

Uveitis. R. H. Witmer. *Journal of the All-India Ophthalmological Society.* Vol. I. p. 15. April 1953.

Three aspects of uveitis are discussed, namely, clinical classification, diagnosis, and treatment.

Uveitis may develop as part of a general systemic infection, as in tuberculosis, brucellosis, or septicemia, due to the actual presence of infecting organisms. The resulting ocular inflammation develops into an endophthalmitis or a septic choroiditis.

Anaphylactic uveitis follows an anaphylactic type of reaction from hypersensitivity to a foreign protein, which may be exogenous, endogenous bacterial toxins, or endogenous organ-specific proteins, e.g., lens and uveal proteins. Congestion, increased capillary permeability causing hemorrhage and exudation, and spasmodic contraction of smooth muscle are the results of such reactions.

Allergic uveitis is precipitated by a fresh bacterial thrombus, or the toxins of these bacteria. Repeated lodging of small quantities of organisms of low virulence, or a continuous supply of these from a focus of infection in the body, affects the sensitization of the eyeball. The inflammation is delayed by 24 to 48 hours, and appears as a local reaction at the site of contact, a general systemic reaction, or a focal reaction. The granulomatous chronic type of allergic uveitis is due to invasion of the uveal tract by living microorganisms, as in tuberculosis, syphilis, brucellosis, iritis, and streptococcal infections. It is characterized by an insidious onset, nodular iritis, keratic precipitates, vitreous opacities, and choroidal exudates. Local hypersensitivity and immunity excited by the invading organisms determine the character of the lesion. Nongranulomatous or serous uveitis is determined by the allergic response of the tissues, induced by invading organisms. Subsequent contacts with live or dead bacteria and their products will set up the allergic reaction, which is acute but with little damage.

Uveitis due to syphilitic or gonococcal infections and brucellosis may be diagnosed by laboratory tests. However, the differentiation between streptococcal and staphylococcal infections on the one hand, and tuberculosis on the other, presents difficulties.

An agglutination test for uveitis due to tuberculosis, based on the Middlebrook-Dubos hemagglutination test, is carried out with aqueous humor. Although some false negative results are obtained, there is a relation in the positive cases between agglutination titer and treatment with para-amino salicylic acid and streptomycin. Patients with high titer responded better and more quickly than those with low titer. The positive sero-reaction in sarcoidosis proves the tuberculous nature of the disease. Positive agglutination in many cases of acute iritis in which no old extraocular tuberculosis can be demonstrated is inexplicable at present.

Microelectrophoresis, carried out on filter paper, indicates that in uveitis patients, the proteins found in inflamed aqueous humor are similar in

distribution to those of the blood serum. Total protein is more or less increased, depending on the severity of the inflammation.

Local treatment of tuberculous uveitis with para-amino salicylic acid by subconjunctival injection does not improve the condition. Subconjunctival streptomycin in combination with general para-amino salicylic acid therapy was most effective. This therapy is not beneficial in cases of sarcoidosis. Symptoms of acute iritis respond well to local cortisone therapy. However, cortisone should be combined with specific antibiotic therapy. Chronic granulomatous uveitis does not respond to cortisone. Nontuberculous uveitis treated with Irgapyrine improves; in chronic cases five to six small X-ray doses (maximum of 150r) often are beneficial. All uveitis patients are given atropine and hot compresses locally, and all recognized infectious foci are removed.

Early Diagnosis of the Adult Primary Glaucomas. J. S. Singer. *The Eye, Ear, Nose, and Throat Monthly.* Vol. 32. pp. 191–196. April 1953.

Adult primary glaucoma may be separated into two distinct entities, simple glaucoma and acute narrow-angle glaucoma. The diagnostic routine for simple glaucoma includes the history, ophthalmoscopy, tonometry, perimetry, provocative tests, observation of diurnal variation of intraocular pressure, calculation of resistance to outflow, and ocular rigidity. Gonioscopy should be done during elevated tension to rule out superimposed narrow-angle glaucoma. Ophthalmoscopic disc observation and case history are not of great value in diagnosing simple glaucoma. Routine tonometry is the best diagnostic procedure. A variation in tension of eight to ten mm. over a 24-hour period suggests simple glaucoma.

Perimetry is not of great value in diagnosing early simple glaucoma, since changes in the peripheral fields are found only after prolonged high intraocular pressure. A number of tests in which positive results are indicated by a provoked increase in ocular tension aid in diagnosing simple glaucoma. Ocular rigidity which differs appreciably from the normal produces errors in tonometric readings. If the rigidity is greater than normal the pressure estimate will be high; if rigidity is below normal the estimate will be low. However, such deviation is rarely sufficient in glaucoma to merit consideration. Tonography, which is continuous tonometry with recording, may be used to calculate the amount of outflow at a given time and pressure. It may make possible the diagnosis of simple glaucoma when all other indications are normal.

Acute narrow-angle glaucoma is diagnosed by biomicroscopic observation of the anterior chamber depth and the anterior segment, evidence of previous acute congestive episodes, gonioscopy to determine the width of the chamber angle and the presence or absence of peripheral anterior synechias, tonometry, and provocative tests. In acute narrow-angle glaucoma the case history is helpful in diagnosis.

Aqueous Veins. K. W. Ascher. *A. M. A. Archives of Ophthalmology.* Vol. 49. pp. 438–451. April 1953.

The discovery in 1941 of aqueous veins of the eye, connecting the canal of Schlemm with the conjunctival and episcleral veins, confirmed the theory

that intraocular fluid is continually produced and eliminated. Such veins are pale in color and may be marked by a visible stratification of blood and clear fluid into two or more layers. They originate in or near the corneoscleral limbus or from a scleral emissary some distance from the limbus. Aqueous veins arising from the latter are the largest and most deeply located, while those from the former are smaller and more superficial. The length of such veins ranges from a fraction of a millimeter to approximately one centimeter, and the width is between 0.01 and 0.1 mm. The intravascular pressure is between eight and 11 mm. of mercury. The canal of Schlemm, the scleral meshwork, and the aqueous veins form a biologic unit charged with the elimination of intraocular fluid.

In glaucomatous eyes the aqueous veins appear to be less frequent and smaller, with less vigorous current than in eyes with normal pressure. Their recognition is difficult, but they reappear upon miotic or surgical normalizing of ocular pressure. The hypothesis that the outlets of Schlemm's canal are narrow in glaucoma would explain the difficulty in discerning the aqueous veins in such cases, and probably provides the primary mechanism for increased intraocular pressure in some cases of glaucoma. Histologic verification is necessary for this working hypothesis.

Treatment of Chemical Burns of the Eye. R. D. Harley. *A. M. A. Archives of Ophthalmology.* Vol. 49. pp. 413–418. April 1953.

Calsulfhydryl therapy for ocular burns was evaluated in 53 pairs of rabbit eyes injured with chemical agents including strong acids, strong alkalis, anhydrides, and specific enzyme-inhibiting compounds. The calsulfhydryl-treated eyes did not respond differently from the untreated control eyes. Only iodoacetate burns responded more favorably when calsulfhydryl treatment was given than when no treatment was used. Caution is expressed in attempting to translate the results of animal experiments to human subjects.

The technique of "denudation of the cornea" is advantageous particularly in alkali burns. Cortisone is of value in the inhibition of fibroplastic proliferation and corneal vascularization.

Miotic Therapy of Chronic Glaucoma—Changing Trends. K. C. Swan. *A. M. A. Archives of Ophthalmology.* Vol. 49. pp. 419–430. April 1953.

Evaluation of chronic glaucoma patients requires regular determination of visual function. Since such patients usually have impaired dark adaptation, the visual field is studied in the dark-adapted eye under relatively low illumination. This technique yields more consistent results and makes possible the detection of slighter defects than was feasible with earlier methods. Tonometric measurements are made on different days at varying hours. The tension is frequently elevated in the early morning and normal in the afternoon.

Drugs such as dibenamine induce miosis by relaxing the iris dilator, effect a dramatic drop of ocular tension, and are useful in emergency control of acute glaucoma. However, the prevailing medical treatment of chronic glaucoma is with drugs which stimulate the iris sphincter and accommodation muscles. Such stimulatory

drugs may act directly on the muscle cells (e.g., pilocarpine), or indirectly (diisopropyl fluorophosphate). Directly acting drugs have a smooth onset of reaction, the intensity of their effect can be maintained at a constant level, and thus such therapy can be prolonged with little disturbance of vision. Indirectly acting miotics, however, act with a violent and variable intensity and induce hyperreactivity of the pupil, accommodative mechanism, and skeletal muscles of the lid. These disturbing effects are less pronounced in the absence of the lens.

Manifestaciones Oculares de la Brucelosis Humana. (Ocular Manifestations of Human Brucellosis.) A. C. Cremona. *Archivos de Oftalmología de Buenos Aires.* Vol. XXVIII. p. 167. April 1953.

Ocular manifestations of brucellosis may involve any or all parts of the eye. A systematic study was made of eye lesions in 160 brucellosis patients ranging from 18 to 60 years of age. More than two-thirds had active brucellosis; the rest were convalescent or had clinically recovered over a year ago. Ocular lesions were found in 89 patients; venous congestion of the fundus was observed in 76, and allergic conjunctivitis in 33. These are the most frequent ocular complications of brucellosis in Eastern Argentina.

The Eye Operating Room. W. B. Clark. *American Journal of Nursing.* Vol. 53. pp. 427–429. April 1953.

Successful eye surgery requires a well-integrated, conscientious team working in a medium-sized operating room, preferably soundproof, which is adaptable for varying degrees of illumination. Instruments must be handled and cleansed gently and carefully and the cutting edges kept very sharp and smooth. Damaged or inefficient instruments must be removed from circulation immediately. Sterilization is accomplished by soaking in 1:1000 Zephiran solution.

Nursing in the Eye O.R. A. S. Devlin. *American Journal of Nursing.* Vol. 53. p. 429. April 1953.

Nursing in an eye operating room requires special training.

Care and sterilizing of drugs and instruments, testing cutting instruments, management of instruments during an operation, and postoperative care of the patient are discussed.

Vision. G. Wald. *Federation Proceedings.* Federation of American Societies for Experimental Biology. Vol. 12. pp. 606–610. June 1953.

Chemical reactions of certain pigments in the retina, provoked by light, lead to the stimulation of nerves, ultimately producing vision. The retinal receptor cells, rods for vision in dim light and cones for color and vision in bright light, contain photosensitive pigments: rhodopsin and porphyropsin in rods, and iodopsin in cones. These pigments consist of a protein to which a carotenoid group (vitamin A-like substance) is attached. It is the carotenoid group to which they owe their color and light sensitivity.

Rhodopsin, the red pigment of the rods, is altered by light, first to the orange-red lumirhodopsin, and then to metarhodopsin at temperatures above −20 degrees Centigrade. The latter breaks down in the presence of water to retinene (a yellow carotenoid) and scotopsin (the protein portion of rhodopsin). Enzymes present in the retina convert retinene to vitamin A. The latter process is reversible. In the

dark, retinene is trapped by scotopsin and rhodopsin is resynthesized. To synthesize rhodopsin from vitamin A and scotopsin, the vitamin must be converted back to retinene. The process is aided when there is an excess of vitamin A and by enzymes. This entire chemical system can be reconstructed in the test tube by mixing vitamin A, scotopsin, and two enzymes: alcohol dehydrogenase which converts retinene to vitamin A, and cozymase which converts vitamin A to retinene. Rhodopsin is formed when the mixture is placed in the dark; in the light it bleaches, forming scotopsin and the carotenoids. Vitamin A exists in a number of isomeric forms, i.e., the molecule may be shaped differently. Only a particular kind of vitamin A, the cis isomer, can be used for the test tube rhodopsin system. In the eye, the retinene which is produced has the wrong shape and would yield an inactive isomer of vitamin A. However, an enzyme, isomerase, contained in the eye tissues converts retinene and vitamin A to their proper molecular forms.

Porphyropsin is characteristic of the rods of fresh water fish, lampreys, and amphibia. It, too, contains scotopsin. However, its carotenoid group, retinene$_2$, which contains less hydrogen than retinene, differs from that of rhodopsin. It gives rise to a different vitamin A known as vitamin A$_2$. The cycle which breaks down and resynthesizes porphyropsin is similar to the rhodopsin cycle. This system is also found in cattle.

The only pigment identified to date in the cones is iodopsin, a violet substance found in the chicken retina, containing retinene identical with that of rhodopsin, and a protein differing from scotopsin, designated as photopsin. The cycle of breaking down and rebuilding iodopsin is essentially the same as that of the other visual pigments.

The light absorption spectrum of rhodopsin is virtually identical to the spectral sensitivity of rod vision. A similar relationship exists between the absorption spectrum of iodopsin and the spectral sensitivity of cone vision. As the eye goes from dim to bright illumination, its sensitivity displaces toward red, involving a shift of vision from dependence on rhodopsin to dependence on iodopsin. Dark adaptation is a reflection of the resynthesis in the receptors of photosensitive pigments which had been bleached by exposure to light. The cones adapt more rapidly than the rods (five minutes and one hour, respectively). Test tube solutions exhibit similar relations.

Color vision in chickens, certain other birds, and turtles requires only one photosensitive pigment; the cones of these animals contain minute red, orange, light yellow, and colorless oil globules which act as color filters. The filter pigments of the chicken retina are carotenoids. In combination with iodopsin they could provide the basis for a tetrachromatic system of color vision. The mammalian retina is devoid of such filters; color vision is probably accomplished by different photosensitive pigments distributed among the cones. The coupling of a single protein with different carotenoids; a single carotenoid with different proteins; or different isomers of the same carotenoid with the same protein, are possible ways in which numerous photosensitive pigments may be formed.

BOOKS AND PAMPHLETS

The Science of Color. Committee on Colorimetry of the Optical Society of America, 1932–1953. Thomas Y. Crowell Company, New York. 385p. $7.00.

The Committee on Colorimetry of the Optical Society of America was organized in 1932 to prepare a detailed report on the science of color. The group was convinced that such a report should contain not only the technical discussions and data required by the color specialist, but also material of a nature sufficiently elementary and interesting to arouse the interest of more casual readers.

Thus the early section of this handsome book is devoted to a popular story—the use of color by prehistoric man and during the ages following. Succeeding chapters deal with the concept of color, anatomy and physiology of color vision; psychological concepts; physical concepts; psychophysics; and, finally, with methods for colorimetry, colorimeters, and color standards.

There are 25 pages of full-color pictures and diagrams and more than 100 other illustrations. Extensive references and a glossary-index add to the book's value.

Syphilitic Optic Atrophy. Walter L. Bruetsch, M.D. Charles C. Thomas, Springfield, Ill. 1953. 138 p. $5.50.

In this book Dr. Bruetsch reports on the fundamental pathogenesis of syphilitic optic atrophy, basing his data on a microscopic study of the visual pathways of eighty patients with all types of syphilis of the central nervous system. Twelve of the patients had complete optic atrophy and two had unilateral atrophy. The author is clinical professor of neurology and psychiatry at Indiana University School of Medicine and is director of the research department at the Central State Hospital in Indianapolis. His research was aided by grants from the American Social Hygiene Association and the National Society for the Prevention of Blindness.

The author is not content merely to relate the clinical course of the disease to the pathologic findings; he also points out the implications of these findings to general practitioners, ophthalmologists, optometrists and syphilologists. Dr. Bruetsch is convinced that atrophy is caused by infiltration of the optic nerve by a chronic inflammatory process, the degeneration of the fibers being a secondary phenomenon. This viewpoint has an important bearing on treatment—if truly effective drugs are used in the earlier stages, before degeneration has become advanced, not only may the process be arrested but some improvement in the field of vision may be expected. Dr. Bruetsch estimates that one-third of the patients with optic atrophy who eventually attend ophthalmologic clinics are first seen by an optometrist. He states that the average delay between this visit and the institution of proper treatment is eighteen months. Saving the vision of these patients will require an educational campaign for all practitioners. Dr. Bruetsch emphasizes the need for careful observation of pupillary abnormalities such as Argyll-Robertson pupils, inequality, irregularity and

sluggish reaction to light. He urges the need for doing perimetry and spinal fluid studies at the least suspicion of syphilis of the central nervous system.

Dr. Breutsch feels that penicillin in adequate doses is probably the most effective treatment and he recommends high total dosages ranging from ten million to twenty million units. A study of the visual fields of one patient given such treatment showed how narrow fields expanded considerably one year after treatment was started.

This beautifully printed report of research and the deductions arising from it will be of considerable interest to all concerned with the prevention of blindness.

Transactions of the American Ophthalmological Society. 88th Annual Meeting, Hot Springs, Virginia, 1952. Volume L. 740 p. Columbia University Press, New York. 1953. $18.00.

The scientific program of this annual meeting included 21 original papers, five theses by candidates seeking membership in the American Ophthalmological Society, and a report of a new instrument designed for tucking the superior oblique tendon.

Notable among the scientific papers is "Ascorbic Acid Content of the Aqueous of Surgically Aphakic Human Eyes," by Peter C. Kronfeld, M.D. Apparently the state of complete surgical aphakia does not essentially change the vitamin C level of human aqueous, although in the rabbit the aphakic eye contains considerably less ascorbic acid than the normal eye. In the human a specific secretory mechanism probably explains the exchange of ascorbic acid between blood and aqueous. Dr. Kronfeld reports that in five cases of surgical aphakia the ascorbic acid content of aqueous samples from filtering bleb fluid ranged from 16 to 25 mg. per cent, while the range in control eyes is 12 to 27 mg. per cent. It is, therefore, not likely that removal of the lens produced a marked lowering of ascorbic acid in the aqueous.

The thesis by Harold F. Falls, M.D. on "The Role of the Sex Chromosome in Hereditary Ocular Pathology" provides a fundamental review of the principles of sex-linked inheritance, and discusses different types of sex-linked hereditary eye defects in terms of the mechanism by which the condition is transmitted. A wide range of ocular pathology is affected by genes in the X and Y chromosomes, many showing incomplete dominance or recessiveness. In giving genetic counsel the recognition and diagnosis of the carrier state in which a condition may be transmitted to later generations by an individual in whom it is not clinically evident is of value. The predictability of totally sex-linked heritable conditions in future generations is very reliable.

Physiology of Vision. A Symposium. British Medical Bulletin. Vol. 9. No. 1. Scientific Editor, W. S. Stiles. Oxford University Press, New York. 1953. 84 p. $2.75.

The work of the Physiology of Vision Committee, carried out at the Institute of Ophthalmology in London, represents a program of research specifically devoted to the elucidation of visual problems. Several research members of the Institute have contributed to the symposium reported in this issue of the *Bulletin*.

Problems concerning the formation and circulation of the aqueous are discussed by Dr. Hugh Davson: intraocular pressure, nutrition of the lens and cornea, chemical composition of the aqueous, drainage, the blood aqueous barrier and its kinetics, and the effects of lipoid solubility.

Mr. E. F. Fincham deals with the influence of ocular convergence and light vergence on ocular accommodation; he also discusses chromatic and achromatic stimuli to accommodation.

Professor Arnold Sorsby's paper on the nature of refractive errors as influenced by variations in the optical components (cornea-lens system and axial length) includes a discussion of the emmetropic eye as an organ correlating axial length with corneal and lens power.

Dr. H. J. A. Dartnall undertakes the interpretation of spectral sensitivity curves and physical factors in their correlation with visual pigments. Professor Herman Hartridge is concerned with chromatic aberration of the eye and the polychromatic theory. Defective color vision and visual properties in the color-adapted eye are discussed by Professor W. D. Wright and Dr. W. S. Stiles, respectively.

Retinal stimulation with small light fields and color vision in the peripheral retina are dealt with by Dr. L. C. Thomson and Mr. R. A. Weale. The absolute sensitivity of the eye and the variation of visual acuity with intensity of light are covered by Dr. M. H. Pirenne. Dr. W. A. H. Rushton reports on electrical records from the vertebrate optic nerve and their significance. Dr. Katharine Tansley has contributed a bibliography of British books and periodicals on the physiology of vision.

Living With a Disability. Howard A. Rusk, M.D., and Eugene J. Taylor. Blakiston Co., New York. 1953. 207 p. $4.00.

Hundreds of self-help devices and gadgets that aid handicapped persons in the performance of their daily activities are described and clearly illustrated in this unique book. The material is based on the findings of two study projects of the Institute of Physical Medicine and Rehabilitation of the New York University Bellevue Medical Center. The National Foundation for Infantile Paralysis and the Disabled Homemakers' Research Fund cooperated.

While the mechanical aids and ideas suggested do not relate specifically to visual handicaps the person with partial sight will undoubtedly derive much inspiration from the book and will be encouraged to adapt certain methods and devices for his own greater independence, efficiency and comfort. Some of these concern layout of rooms to avoid obstacles; arrangement of closets and work spaces; book racks, reading stands and other useful equipment.

The authors emphasize the modern concept that all people have individual differences, but regardless of their degree of difference all are basically the same and can live lives of dignity within the limits of their disabilities.

Principles of Refraction. S. Judd Beach. C. V. Mosby Company, St. Louis, Mo. 1952. 158 p. $4.00.

In this book Dr. Beach summarizes a lifetime of experience in teaching refraction. Although intended for beginners in the field, skilled practitioners will find Dr. Beach's methods of pre-

sentation of considerable interest. An entire chapter is devoted to a discussion of the difficult problems of ocular neuroses and psychosomatic medicine.

Internal Diseases of the Eye and Atlas of Ophthalmoscopy. Manuel Uribe Troncoso, M.D. Second Edition. F. A. Davis Co., Philadelphia. 1950. 684 p. $22.00.

This text is the outgrowth of lectures given at the New York Postgraduate Medical School and Hospital. It is intended for students of ophthalmology, internists and neurologists who wish to learn how to detect and observe changes in the fundus of the eye, how to interpret them and how to use the findings in clinical diagnosis.

The second edition includes selected material describing and clarifying advances made to date in the knowledge of the etiology, pathology and treatment of diseases of the inner membranes of the eye. Corrections have been made in the original text and new illustrations have been added. New sections deal with toxoplasmosis, angiospastic retinitis, Oguchi's disease, Niemann-Pick's disease and others. There is a new chapter on congenital systemic maldevelopments.

The reproduction of the many illustrations and the typography are excellent, adding to the book's usefulness.

STATEMENT OF THE OWNERSHIP, management, and circulation required by the Act of Congress of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233).

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FLORENCE NELSON,
Editor

Sworn to and subscribed before me this 8th day of October, 1953.

CLARE M. DALEY
Notary Public, State of New York

[SEAL]
(My commission expires March 30, 1954.)

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